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MORPHOLOGIC VARIATION AS A FACTOR IN THE SYMPTOMATOLOGY OF PARANASAL SINUS DISEASE *

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The variable morphology of the accessory nasal sinuses, as noted in this study, would appear to preclude the possibility of a constant or pathognomonic symptomatology in disease. The cause and course of certain symptoms depend to a large degree on anatomic variations. These directly influence the pathology, and the failure to cure is often due to the nonrecognition of the existing morphology. This paper is a summary of the anatomic findings in a series of 220 sets of sinuses dissected by me, with especial emphasis on the unusual, together with some applications and interpretations of clinical interest. More detailed reports on some of the observations will follow in subsequent papers.

The specimens were from subjects ranging in age from 20 to 84 years, 80 per cent. being equally distributed between the second, third, fourth and fifth decades; 75 per cent. were males, 66 per cent. were white. For the purpose of this paper, the causes of death are unimportant.

SPHENOIDAL SINUS

The sphenoidal sinus presents the most numerous and interesting relationships. The symptoms from disease are in general the most annoying and the sequelae the most varied and serious.

Headache is a prominent symptom and if it is due, as is generally believed, to the obstruction of the outflow of pus, it must vary in intensity, other things being equal, with the ease or the difficulty with which pathologic exudate finds an outlet. The sphenoidal recess into which the sphenoidal sinus drains may be so narrow anteroposteriorly that any swelling of the mucosa will tend to obstruct drainage. In several cases of this series, the sinus extended anteriorly into the ethmoidal region, leading to an oblique anterior wall and marked lateral displacement of the ostium of communication with the nose. The sphenoethmoidal recess was almost obliterated and the ostium difficult to probe.

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The size of the ostium is of great importance clinically. It varied from pinpoint size to a condition of almost complete absence of the nasal surface of the anterior wall, but in most of the specimens it was such that swelling of the mucosa would prevent, to a marked degree, the exit of pus and the proper aeration and ventilation.

The ostium is practically always membranous, its bony circumference being considerably larger than its actual orifice. Being covered with mucosa and subject to the same pathology, it has a tendency to swell when inflamed and partly or wholly to prevent the outflow of secretion. Occlusion of the ostium without an underlying intrasinus pathology may produce a type of vacuum headache by causing absorption of the contained air and changes in the mucosa, the same as described by Sluder in the frontal sinus.

The dull ache and sense of fulness behind the eye attributed to venous stasis and back pressure is dependent on the degree of pressure inside the sinus and the patency of the ostium. Cacosmia, often annoying, would naturally be greater in those cases in which the obstruction to drainage is more pronounced. A large sinus would also be a factor since it harbors more pus and leads to greater putrefaction.

The various ocular symptoms, such as scotoma and optic neuritis, are important sequelae to sphenoidal disease. A varied morphology is the underlying factor. The optic nerve in 75 per cent. of cases causes the roof of the sinus to stand out in relief, with pockets at either side. There were twelve specimens with dehiscences so located as to expose the nerve. Pneumatization of the anterior clinoid process causes a narrowing of the optic foramen, and extension of disease into this recess of the sphenoidal sinus may involve the nerve.

Schaeffer [1] refers to the optic chiasma as being prefixed or postfixed, meaning thereby that it is prefixed when directly related to the chiasmal sulcus (rare), and postfixed when it is more posterior over the hypophysis. Bitemporal hemianopsia may result from involvement of either sphenoid sinus when the chiasma is prefixed, and in marked asymmetry when one sinus comes into relationship with both optic nerves. Bitemporal hemianopsia is, however, the more usual eye picture in sphenoidal disease. This is in keeping with the relational anatomy, as found in this study.

Approximately 50 per cent. of the sphenoidal sinuses in this series were unusually large. Many of these had various recesses, diverticula and septums, and walls thin enough to permit the direct extension of the toxins into the neighboring structures. Symptoms due to nerve involvement may result from actual pressure of pus or of a thin

1. Schaeffer, J. P.: The Nose, Paranasal Sinuses, Nasolacrimal Passageways, and Olfactory Organ in Man, Philadelphia, P. Blakiston's Son & Company, 1920.

bulging bony wall causing edema which decreases the nutrition and prevents the carrying away of toxins. This does not necessarily mean actual involvement of the nerve fibers.

Anteriorly, in sixteen specimens the sinus was found to extend in the median plane so as to pneumatize the rostrum, and in thirteen cases to enter the septum proper (Fig.1). Both the vomer and the meseth-moid were hollowed out in a wedge-shaped recess—a "sphenoseptal extension." The surgical significance is discussed in another paper; suffice to state here that drainage would be practically impossible in the usual positions assumed by the head.

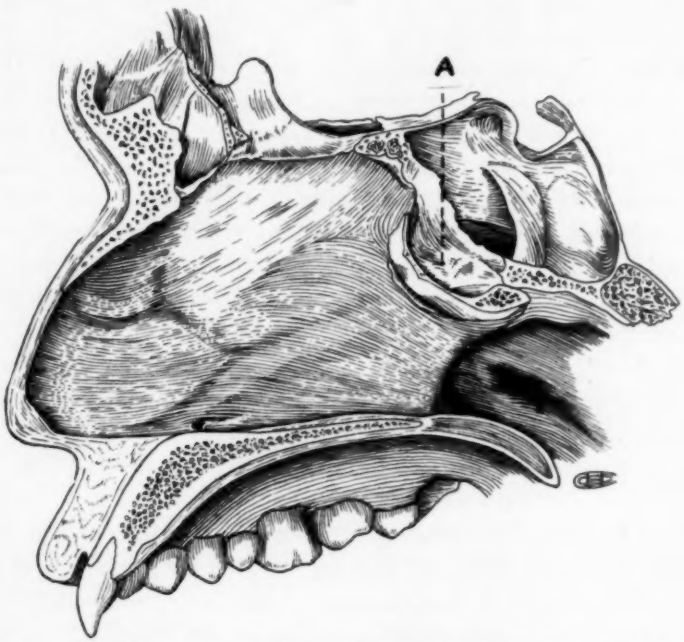

Fig. 1.—*A* indicates the extension of the sphenoidal sinus into the nasal septum.

The varied relationships of the sphenoidal sinus change the symptomatology to a marked degree. The larger the sinus the more complex may become the clinical picture. Superolaterally, the sphenoethmoidal extension may reach ventralward for a considerable distance. In this series one was found to occupy the position of the ethmoidal bulla, displacing completely the posterior ethmoids and part of the anterior ethmoids, thereby establishing intimate relationship between the sphenoidal sinus and the orbit. In disease of a sinus of this type, especially because of the thin walls, orbital complications may be expected.

There were marked extensions into the pterygoid process in eleven specimens. This makes drainage a difficult problem, and it becomes still

more complicated by the presence of septums which obstruct the easy backflow from the extension to the floor of the main sinus. It is here that the sequelae of the so-called focal infections must become a prominent factor. Given a diseased sinus with a good sized unobstructed ostium but with a caudally placed pocket containing pus, we would not expect pressure symptoms but a train of vague, systemic and nonlocalizing symptoms, the source of which would often be overlooked.

In patients who show evidence of absorption of toxins which do not point to any definite organ or organs, it is well to look for signs in the pharynx. A thickened glary mucosa, often covered with heavy secretion or crusts, chronic inflammation of the laryngopharynx and larynx, with such symptoms as hoarseness and hawking, especially on arising, and with asthmatic attacks, should direct the physician's attention to the possibility of involvement of the posterior group of sinuses, particularly the sphenoidal. In a few specimens in which the mucosa of the sphenoidal sinus showed chronic inflammatory change, the pharyngeal mucosa was similarly affected, even involving the mucosa at the pharyngeal opening of the auditory or eustachian tube. Whether the process extended into the tube was not determined, but the possibility of chronic middle ear disease, secondary to chronic sinusitis, is easily within the realm of probability.

The proximity of the floor of the pterygoid extension to the auditory tube rarely may be intimate enough to become a causative factor in pathologic changes of the mucosa, through either dehiscence or thinness of the wall separating the sphenoidal sinus from the cartilage of the tube.

Anterolaterally, the sphenoidal sinus occasionally extends caudally and ventrally, and is separated by a thin plate of bone from the maxillary sinus and from the sphenopalatine (Meckel's, nasal) ganglion. The relationship of this sympathetic ganglion to the maxillary division of the trigeminal nerve must not be forgotten in this connection.

In several specimens, the sinus extended laterad to come into intimate relationship with the ophthalmic, maxillary and mandibular nerves. The vidian nerve was frequently found occupying a position above the floor of the sinus, and in several cases was found exposed. The irritation of almost all the branches of the trigeminal nerve at the same time undoubtedly explains some of the severe types of neuralgia which develop rather early in the course of sphenoiditis. These are in contrast with the involvement of only one branch, or with those types in which one branch is initially irritated and the others respond through transference or reference of stimuli. Figure 2 shows a drawing of a sphenoidal sinus in which the optic nerve, the ophthalmic, maxillary and mandibular

branches of the trigeminal, the vidian nerve and the internal carotid artery all stand out in relief. What a combination of symptoms would follow severe involvement of such a sinus!

The intimate relations of the cavernous sinus, the internal carotid artery and other contiguous structures in the middle and posterior cranial fossae of the skull to the sphenoidal sinus expose them to secondary involvement. The larger the sinus the thinner the walls, especially true of the lateral, posterior and superior walls.

Dehiscences were found in all parts of the sinus, but since the mucoperiosteum was not removed in all cases, in order to preserve certain specimens for future study, the frequency of occurrence was not determined. Two specimens showed a dehiscence between the right and the left sphenoidal sinuses, and one of these also had a dehiscence between an anterior projection of the sphenoid and the maxillary sinus.

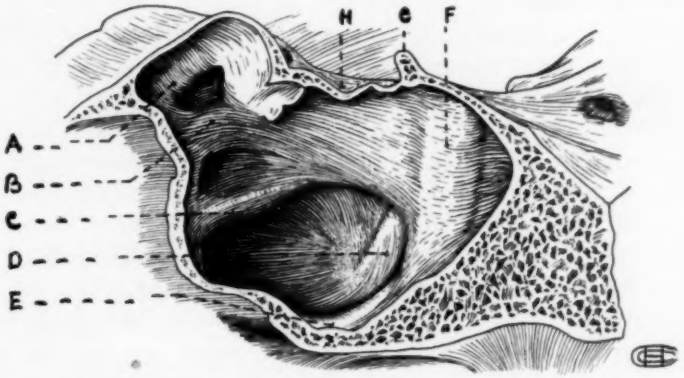

Fig. 2.—Large sphenoidal sinus. The optic nerve *A*, ophthalmic nerve *B*, maxillary nerve *C*, mandibular nerve *D*, vidian nerve *E*, and the internal carotid artery *F* stand out in relief, each covered by a thin layer of bone. *G* indicates the dorsum sellae; *H* the fossa hypophyseos.

Another had a dehiscence in the wall between the right posterior ethmoidal cell and the left sphenoidal sinus, the position of the right sphenoid being occupied by the posterior ethmoid. The right sphenoid was caudal to the posterior ethmoid. In one specimen the internal carotid artery was found exposed.

From the presence of these dehiscences, so far as it relates to symptomatology, much may be learned. It must be recalled that almost all of the dehiscences are bony only, and, therefore, the route of the infection is through the mucosa or mucoperiosteum. Nasal discharge, headache and other symptoms referable to one side may suddenly be found to involve both sides. The most usual way, of course, is by the passage of pus from one nasal chamber to the other, but it is well to remember that it may rarely be transferred through a defective wall.

In a similar way, maxillary involvement of one side may extend into the sphenoid of the opposite side by way of the sphenoid of the same side. Again, posterior ethmoidal involvement of one side may pass to the sphenoidal sinus of the other side by direct extension through its wall, as in the type described in the foregoing.

The possibility of involvement of the cavernous sinus through defects or direct extension through the thin-walled sinuses, should ever be borne in mind. Thrombophlebitis, with its usual fatal results, should be a complication of greater frequency than is encountered, having in mind the large number of thin-walled sinuses. The third, fourth and sixth nerves and the ophthalmic division of the fifth nerve traversing this venous pocket may be involved, one or several at the same time. Before symptoms of thrombophlebitis become prominent enough to enable one to make a diagnosis, some of these nerves must, undoubtedly, show involvement, and careful and frequent examinations should be made for symptoms of involvement of each of these nerves. The development of a thrombus from sphenoidal extension must necessarily take place slowly, and the sixth nerve, being generally the most mesially placed, should usually be involved first.

Involvement, by dehiscence or otherwise, of the internal carotid artery with its relatively thick wall would appear to be a slower process, but irritation of the carotid sympathetic plexus obviously must cause symptoms. Is it beyond the realm of probability that herein lies a cause for many obscure types of headache and other referred symptoms? Spasm of arteries is a recognized condition, and pain is its most prominent subjective symptom. The dulness of mentality, the apathy and the striking changes in character and temperament may be due to the lessened nutrition of the brain, caused by the narrowed lumen of the cerebral vessels which are in a more or less constant state of tonic spasm.

Brain substance is insensible to pain, but this is not so with the meninges, which have sensory nerves. In cases in which the sinus walls are thin, the early involvement of the meninges is inevitable. Here the pain persists or becomes worse at night, even waking the patient. The concomitant symptoms of meningeal irritation, such as rigidity of the neck, retraction of the head and vomiting, may show early in complications from sphenoidal disease.

The hypophysis or pituitary gland becomes a very important structure to bear in mind when considering disease of the sphenoidal sinus. It is well to recall that tumors of the hypophysis may influence conditions in the sphenoidal sinus by pressure necrosis of the thin floor of the sella turcica or hypophyseal fossa. If pathologic exudate finds its way through a dehiscence or by direct extension into the sella turcica, it may push up and compress the hypophysis and its dural sheath. If the diaphragm is tough and has but a small aperture, it may compress the

gland to such an extent as to give symptoms simulating tumor, or it may cause meningitis. The direction in which the hypophysis will be pushed may depend on the morphology of the region, as recently shown by Schaeffer.[2] A heavy dorsum sella would tend to direct the enlargement forward, while a thin or shallow dorsum would permit growth backward. The effect on the optic nerves, chiasma and tracts is of great interest to the ophthalmologist because he may be able to determine from the symptoms which way the growth or abscess may have extended.

Summary.—I should like to lay special emphasis on the following facts:

The presence of a great number of excessively large sphenoidal sinuses with thin walls.

The encroachment of the sinuses on the spheno-ethmoidal recess, thereby affecting drainage.

The presence of "sphenoseptal" extensions.

The frequency of diverticula and septums.

The proximity to important structures.

The difficulty of drainage, especially in pterygoid extensions, and the proximity of these extensions to the eustachian tube.

The possibility of transference of infection from one sinus to another or to the meninges through defective walls.

The danger of curettage and unskilled instrumentation.

POSTERIOR ETHMOIDAL CELLS

The posterior ethmoidal cells and the sphenoidal sinuses are closely related in their topography, and clinically they have much in common. The posterior ethmoidal cells must always be more or less exenterated when the sphenoidal sinus is operated on, because they lie in the line of approach to the anterior sphenoidal wall and are generally involved at the same time.

The ostia are variable in size, and it is difficult to determine the real pathology by the amount of discharge. Naturally a cell with a large ostium in a dependent position will drain quickly. At the time of examination little or no discharge may be seen, especially after the patient has cleared the nose or after it has been washed out, since it takes a considerable time for pus to reform and none is held back in the cells, the drainage of which is unobstructed. In cases with deep ethmomaxillary cells, drainage is defective and conservative treatment is almost useless. Undoubtedly, a great number of cases of chronic posterior ethmoiditis must have some such underlying morphology. Cells of this type should be thought of when there is a persistence of pathology

2. Schaeffer, J. P.: Some Points in the Regional Anatomy of the Optic Pathway with Special Reference to Tumors of the Hypophysis Cerebri and Resulting Ocular Changes, Anatomic. Rec. **28**: 1924.

after a fair trial of conservative treatment. The same may be said in reference to conchal cells, which properly belong to the posterior ethmoidal labyrinth, draining into the superior meatus. These occur often enough to deserve more attention. In this series there were nineteen marked extensions of posterior ethmoidal cells into the middle concha. As a rule, the ostia of these cells are long and narrow and any swelling of the mucosa would lead to retention of exudate.

Almost any of the symptoms found in sphenoiditis may occur in posterior ethmoiditis. The extension of ethmoidal cells into the sphe-

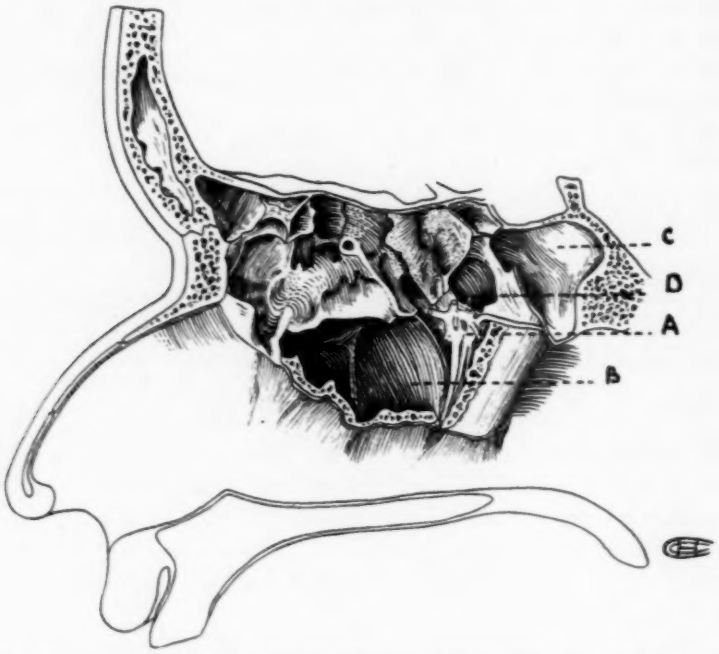

Fig. 3.—Shows intimate relation between spheno-palatine ganglion *A* and posterior ethmoidal cell *D* and maxillary sinus *B*. *C* is the sphenoidal sinus.

noid brings them intimately into relationship with the optic nerve. This condition was of frequent occurrence in our specimens and is of the utmost importance. There was one specimen which showed a right posterior ethmoidal cell replacing the right sphenoidal sinus (the latter being small and pushed to the left) making an unusually intimate relationship with the optic nerve. Other posterior ethmoidal cells were found to extend laterally and dorsally to hollow out the anterior clinoid process.

In one group of forty-three cadavers, thirteen had ethmoidal cells extending into the roof of the orbit, the majority of these more or less

completely covering the orbit. The possibilities for complications are especially worthy of note, as the walls were thin and defects were fairly frequent.

The sphenopalatine ganglion is definitely related to some of the posterior ethmoidal cells (Fig. 3). In some cells the floor was found to be as thin as tissue paper, and was directly over the ganglion. It would seem a simple matter for a pathologic process to invade this area and to involve the ganglion or the nerves entering or leaving it.

Summary.—The important morphologic findings which have a clinical bearing are the presence of conchal and ethmomaxillary cells, the latter closely related to the nasal ganglion; the intimate relationship of some cells to the optic nerve, and the large number of cells overlying the orbit; and the possibility of posterior ethmoiditis simulating sphenoiditis in symptomatology.

ANTERIOR ETHMOIDAL CELLS

Many unusual morphologic variations were encountered which would have a profound influence on the symptoms and course of disease. The most striking were the large number of ethmofrontal extensions, making a double roof over the orbit. These are sometimes designated posterior frontal sinuses. From the frequency of such cells, it seems curious why more complications of ethmoidal disease, such as subdural abscess, meningitis and frontal lobe abscess, are not met with.

During the course of these dissections, the anterior and posterior ethmoidal vessels frequently were found to go from the orbit mesially through the ethmoidal labyrinth and floor of the frontal sinus, lying either in the mucosa, or in the bony partitions, or rarely running free through the sinuses covered by a dural prolongation. Then, instead of entering the anterior cranial fossa and going mesially through the foramina of the cribiform plate and into the nasal chamber, they remained entirely intranasal. This type of morphology adds to the possibility of involvement of the vessels by suppurative process and of extension into the orbit, ophthalmic vein and cavernous sinus.

In two cases an anterior ethmoidal cell grew into the confines of the orbit, making a marked depression laterad in the lamina papyracea. In one case the lamina papyracea bulged mesiad into the anterior ethmoidal region in such a way that any operative procedure in this area would have opened into the orbit.

Rather extensive observations were made on the relations of the ethmoidal bulla and the uncinate process to the ethmoidal infundibulum and to the frontal and infundibular group of anterior ethmoidal cells. Eleven specimens showed fusion of the caudal end of the uncinate and bulla, closing off the posterior end of the infundibulum into a closed

pouch. In such cases any secretion from a frontal sinus or anterior ethmoidal cells would drain directly into the maxillary sinus. In one case the middle third of the uncinate was fused to the bulla. In another the uncinate was U-shaped. Both of these conditions help to direct secretion into the maxillary sinus. In several specimens the uncinate was fused to the horizontal portion of the inferior concha and made a deep cavity of the posterior half of the middle meatus, thereby broadening the caudal half of the infundibulum. On the whole, I feel that the proximity of the uncinate process to the structures laterad makes for a prolific source of trouble and one not sufficiently stressed. Swelling of the mucosa at the semilunar hiatus easily closes off the ethmoidal

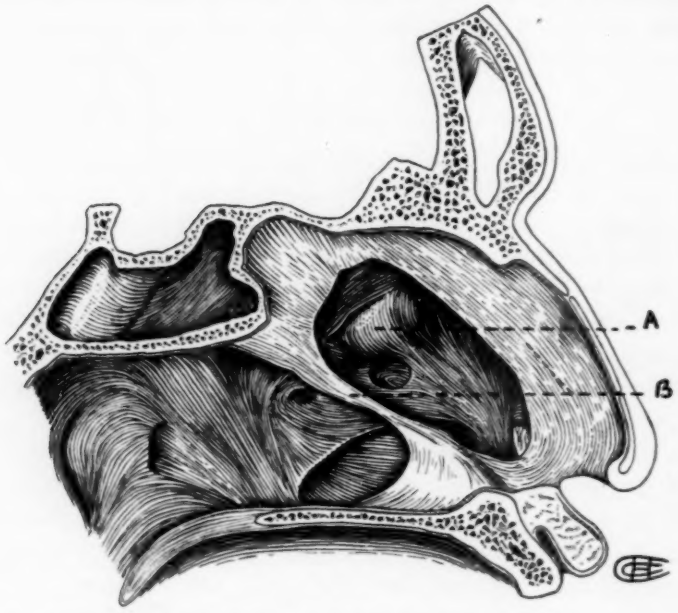

Fig. 4.—Atrophy of the lateral nasal wall, *A* and nasal septum, *B*.

infundibulum, obstructing drainage of the infundibular group of cells as well as the maxillary sinus. If the condition becomes chronic, with resulting hyperplasia and polyp formation, drainage would be practically nil, and if the mucosa of the ethmoidal cells were not undergoing concomitant change, which they invariably do, the ethmoidal cells would become diseased from obstruction to aeration.

Twenty-five per cent. of the specimens presented a hollowing out of the uncinate by an infundibular cell, which extended ventrad to excavate the agger nasi. A good portion of these were situated below the level of their respective ostia, and drainage, therefore, was uphill. From a comparative study of the facility with which drainage takes place

from the agger and the bullar cells, it would appear that the former would more often be the cause of continuous reinfection of the maxillary sinus and would keep up infection in the other ethmoidal cells and even in the frontal sinus. It is important, therefore, that one of the first steps in conservative ethmoidal surgery should be to drain the agger infundibular cells.

The rationale of removing the middle concha and opening the bullar cells is well established and especially advocated by Skillern, but the removal of the middle concha should not be undertaken lightly. Infection may travel to the meninges along the perineural spaces of the olfactory nerve filaments located on the superior and middle conchae. Meningitis following such involvement is invariably fatal.

The nasal septum, part of which is ethmoidal, was found more often straight than otherwise. A good many of the mesethmoids were found to be of tissue paper thinness and in several cases no bone was found at all. The latter condition could not have been postoperative since the rest of the septum was normal, although thinner than usual.

One speciment of unusual interest showed complete atrophy of all the structures inside the nose (Fig. 4). The position of the conchae was evident only by slight ridges on the lateral wall. The septum was all gone except for a strip of membrane about 4 mm. wide, occupying the position of the suture line between the vomer and the mesethmoid and cartilage, and a narrow strip at the anterior edge of the triangular cartilage. [Probably old syphilitic lesion (Sluder).]

Bony dehiscences were not as frequent in the anterior ethmoidal region as elsewhere, but several specimens showed to a greater or lesser extent an absence of part of the bony structures of the mesial orbital wall (os planum), leaving only the periorbita in contact with the mucoperiosteum of the ethmoidal cells.

Summary.—The following facts are worthy of special emphasis:

The frequency of ethmofrontal extensions.

The intra-ethmoidal course of the anterior and posterior ethmoidal vessels.

The existence of bulging of the lamina papyracea either mesiad or laterad.

The great importance of the uncinate process as a factor in disease of the anterior group of sinuses.

The possibility of infection passing along the perineural spaces of the olfactory nerve filaments.

The relative infrequency of deflected septum requiring surgical intervention.

MAXILLARY SINUS

The first step in the treatment of suppuration anywhere is dependent and adequate drainage. In this connection the maxillary sinus falls far short of the ideal. Invariably, the ostium of the sinus is near the upper-

most level of the sinus and as a rule of inadequate size. This in itself would make drainage, especially of thick secretion which sticks to the walls, a difficult problem. Added to this, the ostium opens into the floor (rarely in the lateral wall) of the ethmoidal infundibulum. When the mucosa of the infundibulum and maxillary ostium is thickened, it readily leads to occlusion of the normal discharge channels. It seems logical that one of the first steps in the treatment of maxillary sinusitis, secondary to frontal or to ethmoidal disease, should be the removal of the uncinate process. By eliminating the gutter, which compels the exudate from above to drain into the maxillary sinus, we remove part of the cause and also help drainage.

In treatment of maxillary sinus disease, it might be a considerable aid if the region of the ethmoidal infundibulum were well shrunk preliminary to the usual procedure of entering the sinus with the needle or trocar through the inferior meatus, so that the exudate and cleansing fluid could be expelled more easily. This would eliminate the use of excessive pressure which may force pus or other material through dehiscences into the orbit, ethmoidal cells or soft tissues of the face.

In this series there were 60 specimens (about 25 per cent.) with accessory ostia ranging in size from 1 by 1 mm. to 10 by 6 mm. and in number from 1 to 4. Their existence must be of more or less value in drainage. As a rule, in those cases in which they were present, the mucosa of the locality was thin, and it would have been a simple matter to enlarge the opening to secure more drainage and to facilitate lavage. Here I wish to make a plea for the more frequent use of the nasopharyngoscope. With the regular speculum, little detail of the lateral nasal wall really is seen. There must be many local lesions which are being overlooked, especially early, and the origin of pus often can be definitely determined only with the nasopharyngoscope. Infraction of the middle conchae is indicated, if necessary, for diagnosis or treatment.

The size of the maxillary sinus has a definite influence clinically. The thin walls come into intimate relationship with the dental plexus, the infraorbital nerve and the sphenopalatine ganglion and its branches. We may expect more neurologic symptoms from a large sinus with thin walls than from a small sinus with thick walls. The walls of a large sinus from an aged subject were almost transparent. All the branches of the dental plexus coming from the anterior, middle and posterior superior alveolar nerves were more or less exposed. The alveolar process was completely absorbed. A slight blow or perhaps biting on a hard object could cause a fracture. Malignancy, attacking such a thin bone, would lead to early deformity. It is also self-evident that entrance into the sinus, whether for diagnostic puncture, for lavage or for operative intereference, is relatively easy.

There was one specimen in which all the antral walls were about 1 cm. thick and the ostium small. In such cases, the usual technic for antrum puncture is difficult and the roentgen ray is especially valuable. It would be best that all patients coming for sinus diagnosis be roentgenographed before puncture.

Septums and diverticula were very common in this series, and varied from a mere mucosal ridge to an almost complete bony septum, making a real double sinus (Fig. 5). The number of septums varied, and they extended in all directions. Not only do they make drainage and lavage difficult and ineffectual, but the increased mucosal surface adds more pathologic fuel.

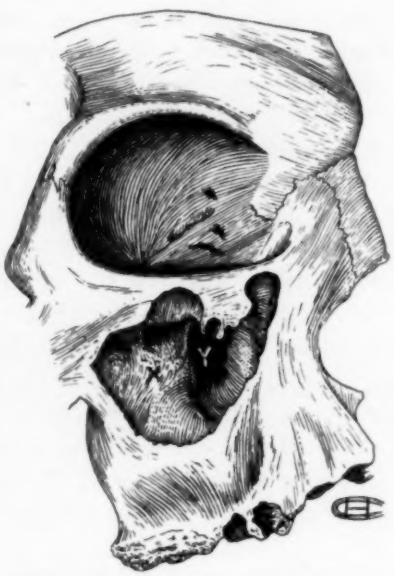

Fig. 5.—Double maxillary sinus. Outer wall of anterior maxillary sinus removed. *X* refers to wall between the anterior and posterior sinuses; *Y* to the communication between the two.

The tooth most frequently found nearest to the antero-inferior angle of the maxillary sinus was the second molar. Strangely, in only a single instance was a tooth root found to be exposed in the floor. The layer of compact bone over the roots was usually not so thin that it would be removed during curettage of the mucosa if ordinary care were exercised. It would seem, therefore, that there is practically no danger in the usual run of cases to the mesial roots or the vessels and nerves entering them. It is not uncommon to find vessels and nerves which will form the dental plexus directly under the mucosa. From a study of this plexus of nerves it becomes apparent that, in

doing the external radical operation, if no more bone be removed than is absolutely necessary to admit fine angulated curettes, such as those of Coakley, and if the opening be kept close to the infraorbital foramen, the vitality of the teeth need not necessarily be sacrificed. The use of a small electric illuminator or of the nasopharyngoscope in the sinus would obviate the possibility of leaving diseased mucosa, especially if one bears in mind the location of all possible diverticula.

There were several specimens in which the nasal wall of the maxillary sinus bulged into the sinus, making a deep inferior meatus with a marked palatine extension. The careful removal of all mucosa in these various extensions would be necessary in a diseased state. There were others in which the wall was straight and yet the palate was well excavated. On the other hand, bulging of the nasal wall into the meatus may cause some obstruction to the nasolacrimal duct, especially when there is hyperplasia of the mucosa. The symptoms and signs of such obstruction are important to the rhinologist and ophthalmologist, in that they would direct attention to the inferior meatus.

A word of warning here may not be amiss in reference to the technic used for antrum puncture. It is well to go back at least 1 inch (2.5 cm.) from the anterior edge of the inferior concha, in order to avoid the nasolacrimal ostium. Trauma to the region of this ostium may lead to cicatrization and possibly to complete blockage and atresia of the lower end of the canal or duct. In using the needle or trocar, whether straight or curved, it is much safer to tap the outer end slightly with a mallet than to push it in with the palm or fingers. This absolutely obviates the possibility of going into or through the opposite wall, especially if it be thin, as so often it is. Also, it is pertinent that a sharp point be used to make sure that the mucosa is not pushed ahead of the needle.

The presence of dehiscences was noted in all the walls of this sinus. Especially interesting was one in the floor of the infraorbital canal. How simple it would be for neuralgia to develop if such a sinus became diseased.

Summary.—The following facts are especially to be borne in mind:

The influence of the uncinate process and ethmoidal infundibulum on drainage.

The value of the nasopharyngoscope.

Associated neuralgia of the infraorbital nerve and of the superior alveolar nerves would indicate a large sinus, but lack of neurologic symptoms would not rule out involvement of the maxillary.

Marked irregularity of the contour of the sinus with recesses.

The frequent presence of septums varying in extent from a mere ridge up to one making a double sinus.

FRONTAL SINUS

Pain and headache are very prominent symptoms of disease of the frontal sinus and both are more or less relieved by drainage. Eventually all drainage comes into the middle meatus. In this series 30.5 per cent. were found to drain into the ethmoidal infundibulum and 67.1 per cent. into the frontal recess. In four specimens, or 2.4 per cent., the frontal sinus had developed from a bullar cell (Fig. 6), so that any drainage would be found much further posterior, and it would have greater difficulty in escaping because the middle concha hugs the bulla, and also on account of the fact that the ostium is in the superomesial wall and not in the floor of this cell. The coexisting swelling of the mucosa

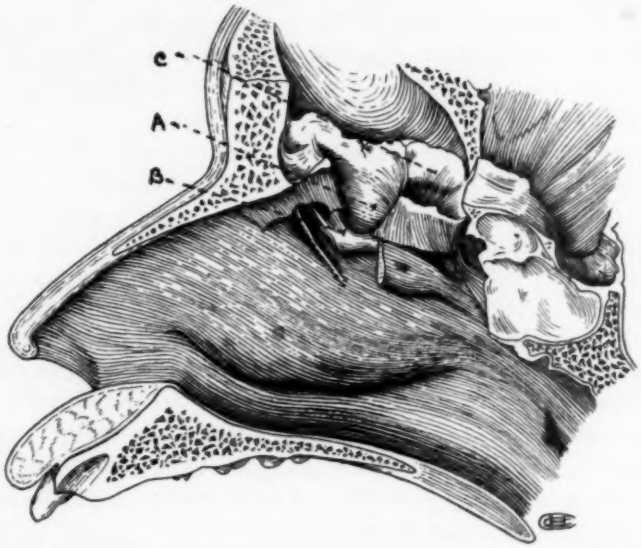

Fig. 6.—Frontal sinus, *A*, which has developed from a bullar cell, *B*, and which drains into the middle meatus just beneath the center of attachment of the middle concha (oblique view).

practically makes a perfect stopper to the ostia. The impossibility of probing such a sinus and the greater severity of the symptoms must be self-evident.

One sinus was so extensive that it excavated the superior and middle concha and its ostium was in the lateral wall of the superior concha close to its attachment. If such a sinus were diseased, complete drainage would never occur. Several of the larger sinuses excavated the nasal bones and the frontal process of the maxilla, making a deep pocket far enough ventrad to escape the usual intranasal operative interference. A large number had marked horizontal (orbital) extensions coming into close relationship to the orbital contents. How much influence these

nondraining pockets have on symptoms due to stagnation and absorption is conjectural. That they must have some is obvious, for the lymph must carry away some of the noxious products. In such thin-walled sinuses, disease may break through externally, causing edema and phlegmon of the scalp, or into the orbit with its manifold possibilities. Intracranially it may cause a brain, subdural and extradural abscess or meningitis.

In sinuses with septums varying from a mere ridge to almost complete separation, examples of which were many, the problem of drainage becomes a serious one. When the sinus of one side overlaps that of the other side to a marked extent, symptoms will be more or less referable to both sides, while the intranasal signs will be on one side. Several specimens showed two frontal sinuses on one side with separate ostia, the posterior one being in the horizontal plate. Infection of one does not necessarily mean that the other will be involved; but where both are diseased and only the anterior one is opened and drained, the posterior sinus will continue to cause symptoms.

Vacuum headaches, due to occlusion of the frontal ostium, have such a definite morphologic basis in the frontal region with its complicated anatomy that much need not be said here. Sluder's work in this connection is thoroughly verified. Whether there was a real nasofrontal duct, which was not frequent in this series, or whether drainage was direct, any swelling of the nasal mucosa would promptly plug the sinus and there would be an absorption of the contained air with resulting negative pressure and the well-known sequelae. The same condition results from the swelling of the mucosa in the frontal recess and in the ethmoidal infundibulum, as well as from a tightly apposed middle concha. The small diameter of the ethmoidal infundibulum, especially when the uncinate process is close to the lateral wall, would predispose to a complete blocking up with the least swelling.

The largest sinus of the series measures 65 mm. transversely, 52 mm. cephalocaudally and 35 mm. anteroposteriorly. In one specimen there was complete absence of the frontal sinus. The relation of size to the severity of symptoms is self-evident. The thinness of the walls in the large sinuses would act as a poor barrier to fractures. The presence of dehiscences is also greater. It has been shown that there are small venules going from the mucosa of the sinus outward through the bone into the subdermal tissue, and that these may become thrombotic when the sinus is involved.

The tenderness at the insertion of the trochlea of the superior oblique muscle can often be explained by the thinness of the floor of the sinus at this point, as well as by the presence of the supratrochlear nerve.

Probing the frontal sinus seemed to be especially difficult in many specimens of this series. The large number of infundibular cells, as

well as of frontal recess cells, presented so many ostia for the probe point to enter that it was often impossible to escape them.

Deformities of the septum did not appear to interfere much with probing. There were few markedly deviated septums; in fact, there were only a few that would have required operation.

The close relationship between large horizontal extensions of the frontal and ethmofrontal cells should be borne in mind. There is nothing to prevent erosion of the thin plate separating these structures, thereby involving the contiguous cells. If radical operative procedure becomes necessary, it would seem imperative that the anterior ethmoidal cells be carefully opened and that the possibility of the existence of the ethmofrontal extensions be kept in mind.

Summary.—The possibility of the development of some (rare) frontal sinuses from bullar cells.

The influence of the middle concha and structures laterad on disease of the frontal sinus.

The difficulty of probing the frontal ostium.

The possibility of posterior frontal sinuses keeping up symptoms after frontal sinus operations.

2178 Broadway.

UNUSUAL PHARYNGEAL LESIONS*

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The laryngologist, as a rule, becomes quite expert in the diagnosis of lesions which are primary in the nose and throat. The lesions of the mucous membrane which are secondary to general diseases are often more difficult to diagnose. It is important to note that the first manifestation of certain general diseases may occur in the nose, throat or mouth, and on this account the patient consults a laryngologist primarily. If the laryngologist is not cognizant of the nature of the disease and does not immediately refer such cases to the internist, the general treatment which is required may be delayed until little can be accomplished. The four cases reported here are illustrative of diseases which may manifest themselves first in the nose, throat or mouth. The lesions were all different and unusual.

REPORT OF CASES

CASE 1.—*Nodular Tumors of the Mucous Membrane of the Pharynx and Larynx in Chronic Lymphatic Leukemia.*—A woman, aged 65, came to the Clinic, June 23, 1915, on account of tumors of the nose and forehead, and hoarseness. About a year before, she had noticed a red lump in the right brow which extended across to the left eyebrow. Eight months later a tumor developed over the nose which increased in size. She had recently noticed a red patch on the left cheek. For three months she had been getting hoarse. Her general health was good and she had no other complaints.

Examination revealed bluish-red, soft masses in both eyebrows and over the nose and the left cheek, similar areas over the backs of the hands, also enlargement of all of the superficial lymph nodes and the spleen. There was a nodular, somewhat soft, thickening of the mucous membrane of the entire hard and soft palate, as well as of the tissues of the larynx. The false cords stood out as nodular tumors, as well as an area at the base of the epiglottis. The hemoglobin was 80 per cent., erythrocytes numbered 4,880,000 and leukocytes 23,600; the differential count, polymorphonuclear neutrophils 21.7, lymphocytes 73.3, large mononuclears 4.7, and eosinophils 0.3 per cent.

Microscopically, the nodules showed marked lymphocytic infiltration. A diagnosis of chronic lymphatic leukemia with involvement of the mucous membrane was made. At that time treatment for the general condition only was given. At the present time radium would have been used and the tumors would have disappeared.

Comment.—In leukemic tumors of the mucous membrane, the leukemic infiltration lies in the mucosa and the submucosa and around the mucous glands. In chronic cases, the most common involvement of the pharynx is the lymphoid enlargement of the tonsils. The leukemic collection in the larynx or trachea occurs in nodules in the mucous mem-

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* From the Section on Laryngology, Oral and Plastic, Mayo Clinic.
* Read before the Middle Section of the American Laryngological, Rhinological and Otological Society, Lafayette, Ind., Feb. 22, 1925.

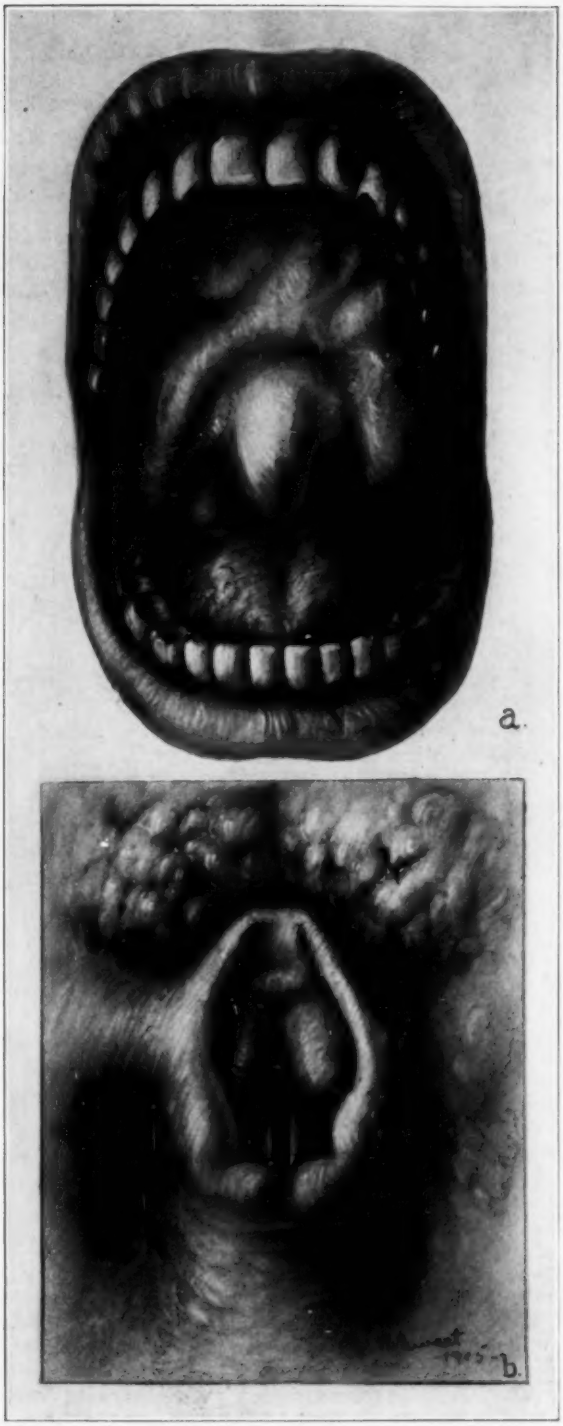

Fig. 1 (Case 1).—Chronic lymphatic leukemia. Note the nodular enlargement of the palate, lingual tonsil and larynx, especially the false cords, due to lymphocytic infiltration.

brane which may ulcerate. The false cords may form diffuse infiltration which may cause respiratory obstruction. The true cords and epiglottis are rarely affected. Involvement of the pharynx and larynx, as in this case, is rare in chronic lymphatic leukemia.

CASE 2.—*Ulceration of the Pharynx and Mouth in Acute Lymphatic Leukemia.*—A man, aged 46, came to the Clinic, Jan. 19, 1925, with a history of having had trench mouth for one month. Four months before, he began to lose pep,

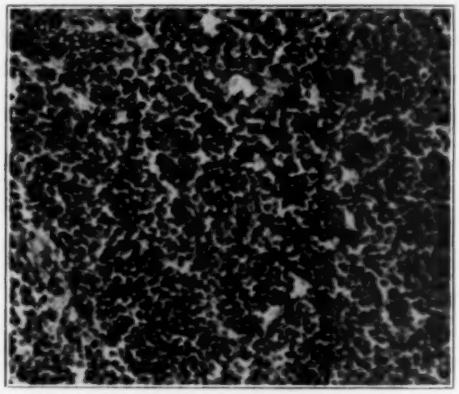

Fig. 2 (Case 1).—Chronic lymphatic leukemia. Low power photomicrograph showing the character of the tissue removed.

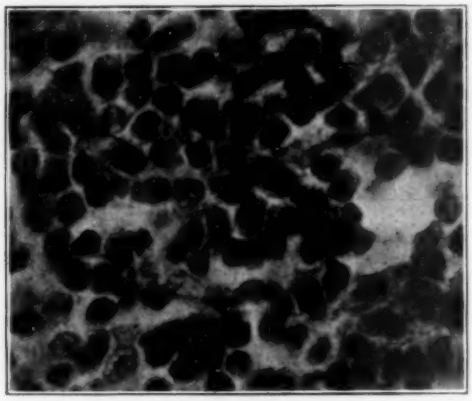

Fig. 3 (Case 1).—Chronic lymphatic leukemia. High power photomicrograph from tissue.

and three months later noticed that his mouth was sore. After a week or so of silver nitrate treatment this condition cleared up, but he continued to feel poorly. Two weeks later the mouth condition recurred, the palate and pharynx became swollen and the patient went to bed. Silver nitrate and chromic acid treatment and neoarsphenamin injections were given. There was some loss of weight the last month, and the temperature ranged from 101 to 103 F. in the afternoon the last few weeks. He complained of fulness of the mouth and throat, and swelling of the neck externally.

The patient was pale. The soft palate and pharynx were anemic looking, and the left upper jaw and left side of the pharynx were ulcerated. The lesion seemed to be necrotic and there was a fetid odor to the breath. The systolic blood pressure was 104, diastolic 48, and the temperature 103 F. There was a regular systolic murmur which was most intense over the fourth left costal cartilage. There was a fulness of both sides of the neck, with small nodes in the left upper cervical region. The complete blood count revealed hemoglobin 40 per cent., erythrocytes 2,750,000 and leukocytes from 6,700 to 6,200, and a color index of 0.7 +. The differential count revealed lymphocytes 15.0, large mononuclears 6.5, neutrophilic myelocytes 3.0, normoblasts 0.4, lymphoblasts 75.5 per cent., and slight anisocytosis, poikilocytosis and polychromatophilia. The urine had a specific gravity of 1.022, and acid reaction; it contained albumin 3, hyalin casts 1, granular casts 1 and pus cells 1.

A diagnosis of acute lymphatic leukemia with secondary involvement of the mouth and pharynx was made, and the patient was sent home.

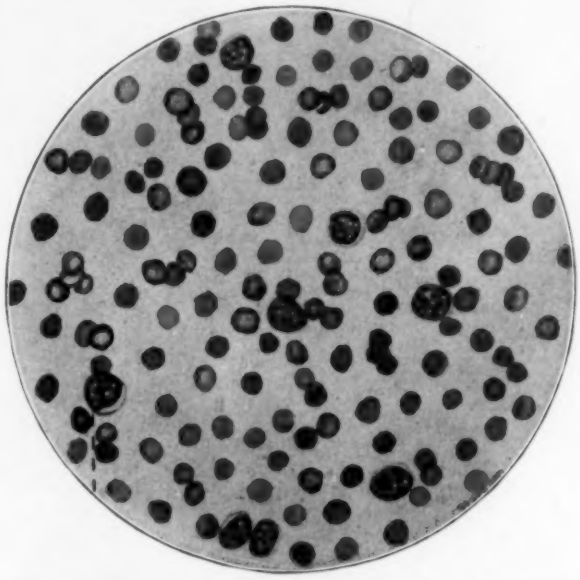

Fig. 4 (Case 1).—Blood picture, chronic lymphatic leukemia. Note the increase in leukocytes (23,600) and the percentage of lymphocytes (73.5).

Comment.—Acute lymphatic leukemia is especially interesting from a laryngologist's standpoint. In such cases, a great deal of treatment is usually given for Vincent's angina or cellulitis of the neck, or other infections of the mouth or throat, before the true diagnosis is established. The course of the disease is rapid, the average case terminating in death in about four months. As a rule, the patients present themselves to a laryngologist for the local condition of the mouth and throat, rather than to the internist. The sloughing lesions of the mouth and pharynx, associated with a rapidly failing general condition, are pathognomonic. The blood count frequently does not show an increase in the number of leukocytes, but the large percentage of lymphoblasts and the small

Fig. 5 (Case 2).—Chronic ulceration of the left side of the pharynx and palate of acute lymphatic leukemia.

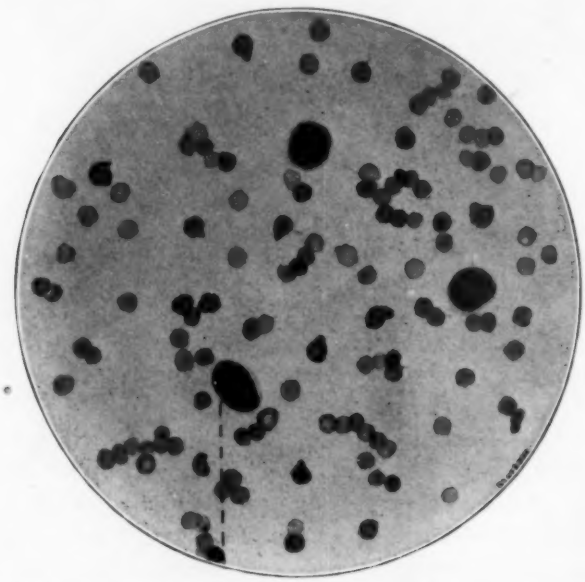

Fig. 6 (Case 2).—Blood picture, acute lymphatic leukemia. Note the low leukocyte count (6,700) and the large percentage of lymphoblasts (75.5).

number of neutrophilic myelocytes are striking. Normoblasts are also present, and anisocytosis, poikilocytosis and polychromatophilia are noted. No treatment has been found which is of any value for this condition. It is essential, however, to make an early diagnosis in order to inform the relatives of the prognosis.

CASE 3.—*Pharyngeal and Laryngeal Leprosy.*—A man, aged 40, came to the Clinic, Dec. 20, 1923, on account of hoarseness, from which he had suffered for two years. He stated that two years before, the hoarseness came on rather suddenly, within a few hours, and that there had been no real change in the character of his voice since. He had no trouble eating or drinking, and had no pain. Three years before, he noticed some wasting of the muscles of the hands, which he thought had steadily increased.

Fig. 7 (Case 3).—Leprosy of the pharynx and larynx. Note the nodules over the soft palate, tonsils and larynx.

Examination revealed multiple small nodules over the forehead and face, and multiple nodules over the palate and both tonsils and uvula. Both vocal cords were somewhat irregular in outline and nodular, and the enlargement of the right arytenoid was also nodular. Both nostrils were crusted and bled quite readily. Smears from the nose stained for acid-fast bacilli showed the typical small, bundle-like clumps so characteristic of leprosy. General and neurologic examinations were not made, as it was not thought advisable to prolong the patient's stay at the Clinic when the diagnosis had already been made.

Comment.—Leprosy is a contagious endemic disease, due to the *Bacillus leprae,* which causes changes in the mucous membrane, skin, nerves, bone and other tissues. The exposure occurs from a few weeks to twenty years before the disease appears. The average duration of the disease is about eight years. The findings from a laryngologist's standpoint are the nodules about the face, with the deep fissures; the nodules on the palate, pharynx and larynx; the dryness and crusting of the nose

and respiratory passages, with bleeding at times; the atrophic changes, due to involvement of nerves, the hyperesthesia and anesthesia of the skin, and the dermatologic changes in other parts of the body. The leprous nodules are granulation tumors similar to those of syphilis or tuberculosis. The nerve changes are in the peripheral nerve trunks and

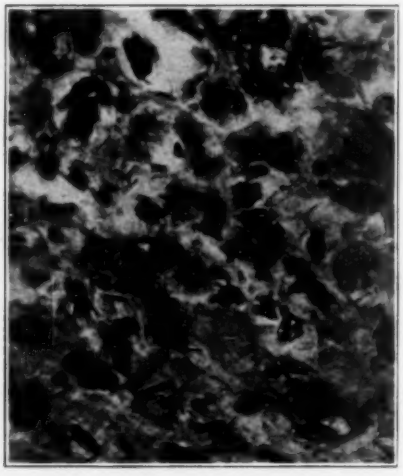

Fig. 8 (Case 3).—Photomicrograph of leprosy. Note the cigar-like bundles of acid-fast bacilli of leprosy.

Fig. 9 (Case 4).—Pemphigus of the pharynx. Note the fibrinous exudate over the palate and pharynx, and the two bullae on the left soft palate and anterior pillar.

their branches, and are due to invasion of the nerves by the bacilli. A diagnosis depends on finding the *Bacillus leprae* in cigar-bundle clumps in the secretions from the nose, or in direct smears stained for acid-fast bacilli, when there is early nodular thickening and ulceration of the nose, larynx and pharynx.

CASE 4.—*Pemphigus of the Pharynx and Mouth.*—A woman, aged 49, came to the Clinic, Nov. 5, 1923, complaining of a sore throat and mouth of two weeks' duration. During the last four or five days, she had had canker sores in the mouth. She had had similar sores previously but not so many. There was no general complaint. The family history was negative, and she had had no diseases other than those of childhood.

Examination was negative except for multiple superficial ulcers of the mucous membrane of the mouth and pharynx, and tender and palpable right submaxillary glands. The ulcers appeared typical of pemphigus although there were no blebs on which to base a diagnosis. The mucous membranes of other parts of the body were not affected. The patient was observed daily until November 12, when two definite blebs, quite typical of pemphigus, appeared. One was in the left tonsillar region and one on the left soft palate. The patient was referred to the Section on Dermatology for treatment and observation. The ulcerations of the mouth became progressively worse and had involved the cheeks and tongue by December 14, and there was marked fetor. Jan. 8, 1924, the skin and the mucous membrane of the eyelids, rectum and vagina were covered with bullae. The patient had to go home on account of finances; she died about six months after the original examination.

Comment.—Pemphigus of the mouth and pharynx without involvement of other mucous membranes or the skin is not so unusual as it is thought to be. In a group of twenty-nine patients examined in the Mayo Clinic during the last five years (from 1919 to 1924), nineteen (65 per cent.) came primarily for the throat and mouth complaint. Early diagnosis is important, so that the prognosis can be explained to the relatives. Most such patients have consulted many physicians and have had all kinds of local and general treatment without a definite diagnosis being made. The characteristic ulceration with fetor leads to the suspicion of pemphigus, and if after repeated daily observation the bleb is found, the suspicion is corroborated. Such cases so far are interesting only from a diagnostic side, as treatment has afforded little benefit. The condition is usually fatal. The rapidity with which the cutaneous manifestations follow the lesions of the mouth and throat is an index to the virulence of the disease and the length of time before the fatal outcome.

PNEUMOVENTRICULOGRAPHY IN THE LOCALIZATION OF BRAIN ABSCESS

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Brain abscess often presents unusual difficulty in diagnosis and in localization. In otitic abscess, uncertainty may arise between cerebellar and temporosphenoidal lesion. When severe infection of the ear and nose precede the general symptoms of brain abscess, without focal symptoms, confusion is likely to occur. Brain abscess develops in certain patients without any definite history of previous local infection, and localization in this group, by the usual means, frequently proves difficult or impossible. Recently I saw two patients with brain abscess of three or four months' duration that could be localized only by pneumoventriculography.

REPORT OF CASES

CASE 1.—A man, aged 44, had been sick three months when I saw him in May, 1924. His trouble began with a cold in the head. Two days later headaches were very severe, he developed pain in the right ear and the drum ruptured a few hours later. He had a severe chill, and a right frontal sinus infection occurred. An acute mastoiditis subsided without an operation within ten days. The headache continued, and about three weeks later an internal frontal sinus operation was performed on the right side along with drainage of the maxillary sinus. He improved, but had severe pain in the back of the head.

General improvement was reported for about two weeks; then the right frontal sinus pain returned and the headaches were almost unbearable. The patient's condition became worse; speech was indistinct, and he vomited some. His mentality was good. There were no convulsions, but his wife stated that the left arm and leg had been weak for some time. Vision had been blurred for about two weeks and he had been in stupor for five days.

Examination revealed weakness of the left arm, leg and face, and a marked left Babinski sign. There was no certain sign of disturbance in the cerebellum; the sensory tests were unsatisfactory. There was evidence of previous trouble in the right middle ear and pus in the right naris. There were double choked disks, but there was no strabismus and no spontaneous nystagmus. The caloric reaction on the right side consisted of a few short twitches and then a conjugate deviation of the eyes to the right. Hearing had been fairly good in each ear. Reactions of the other cranial nerves were apparently normal. His pulse was 72, temperature 98, and respirations were 18 per minute. The blood count was 12,600 white cells; polymorphonuclears, 82 per cent.; lymphocytes, 15 per cent. Roentgen-ray films revealed marked cloudiness of the right frontal sinus and of the right mastoid.

Within a few hours the general condition of the patient was much worse. There was nothing certain as to localization of an abscess. The motor disturbance was most likely from a lesion above the tentorium, but there was uncertainty as to a temporal or frontal lobe infection when the history and roentgen-ray films were considered. Pneumoventriculography was successfully utilized in making an exact localization of the abscess by removal of 20 c.c. of fluid from the left lateral ventricle and by injection of a like amount of air. The roentgen-ray films revealed that the anterior horns of both lateral ventricles were crowded

up and across the midline to the left; consequently the abscess would be situated in the right frontal lobe (Fig. 1). Operation verified this, but, as a result of his previous precarious condition, the patient did not regain consciousness and died several hours later.

CASE 2.—A boy, aged 12 years, was referred to me for examination Nov. 25, 1924. With the exception of occasional moderate headaches, he had never been sick until July 16, 1924, when he developed severe headaches with fever and swelling about each eye. Two weeks later the spinal fluid cell count was 2,400, temperature from 102 to 104 F. He was treated for meningitis, but did not improve. A small abscess formed over the right frontal region which was opened and drained for two weeks. Roentgen-ray films revealed a clouded left

Fig. 1 (Case 1).—Right frontal lobe abscess. Anterior horn of the right ventricle is displaced across the midline to the left (anteroposterior view).

frontal sinus which had been curetted through an external opening on August 25. He had a slow pulse and some vomiting, and seven severe convulsions occurred about this time. He improved for about three weeks; then headaches and vomiting recurred and choked disks developed. One week later, necrosis of the frontal bone in the midline and thrombosis of the superior longitudinal sinus were apparent. These disturbances were successfully removed over an area of 3 by 7 cm. For about one month he improved, but had occasional headaches and vomiting.

At the time when I saw him, he was unable to walk, but his speech and mentality were good. In addition to vomiting, headaches, choked disks, convulsions, a temperature of 101 F. and pulse 90, he had paralysis of the external rectus of the right eye, widely dilated pupils, loss of right patellar reflex with a

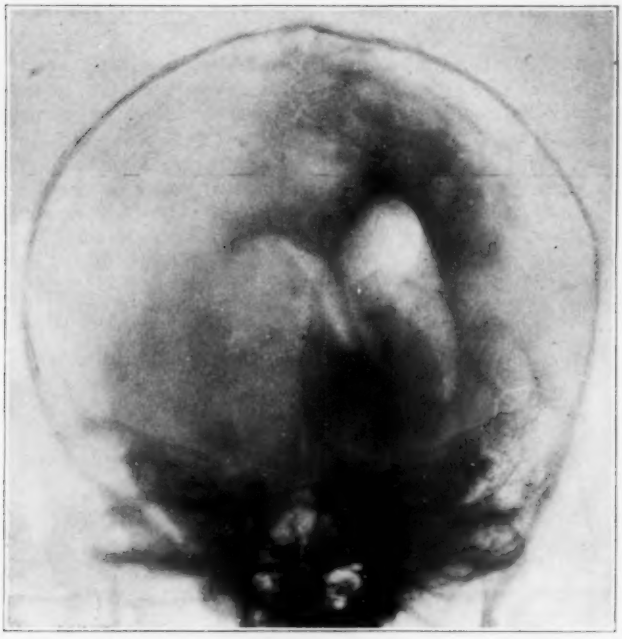

Fig. 2 (Case 2).—Right frontal lobe abscess, with right ventricle displaced to left and moderate hydrocephalus of left ventricle (anteroposterior view).

Fig. 3 (Case 2).—Absence of anterior horn of right ventricle. Right frontal lobe abscess.

marked Babinski sign on the right, and bulging of the operative wound in the frontal midline. The olfactory test was not satisfactory. The blood, urine and spinal fluid were normal.

There were symptoms of obstructive hydrocephalus and possibly of a frontal lobe abscess, but there were no certain indications of the side involved. Thirty cubic centimeters of clear cerebral fluid was removed from the left lateral ventricle, and 30 c.c. of air was injected. The roentgen-ray films then revealed absence of the anterior horn of each lateral ventricle, while the anterior-posterior shadows of both lateral ventricles were displaced across the midline to the left and there was a moderate degree of hydrocephalus (Figs. 2 and 3).

The King operation on the right frontal lobe disclosed a large abscess, which extended across the midline by displacement. Immediate improvement occurred, and in six weeks he was apparently almost well but had a slight limp on the left side. He then suddenly developed headaches and vomiting; within four or five hours he was unconscious, and within twenty-four hours he had several hundred severe convulsions. I was present when the first convulsion occurred, and immediately opened the original wound and drained another small abscess from near the upper portion of the right rolandic area. In a few days he was again on the road to recovery, and two months later, was at his home in Oklahoma, apparently well.

Valuable information was obtained by ventricular puncture in another case, with indefinite etiology and with evidence of a brain abscess somewhere in the left cerebral hemisphere. The patient was unconscious and having many severe convulsions. She had choked disks and partial paralysis on the right side. The right lateral ventricle contained only a few drops of clear fluid and air could not be injected, but this indicated that the abscess was not in the frontal or temporal lobe. An opening was made near the hairline in the left frontal region, and pus was encountered which came from a large abscess near the intersection of the rolandic area with the midline. Extensive encephalitis was present and the patient died a few days later without regaining consciousness.

COMMENT

In the early stages of brain abscess, pneumoventriculography might be hazardous, but later, and especially in chronic cases, it is not very dangerous and it is of great value in localization whether the abscess be in the cerebellum, in the frontal or in the temporosphenoidal lobe or extradural. The test will be positive in all patients where gross changes occur in the eyeground from increased intracranial pressure.

1. In well developed frontal lobe abscess, ventriculography reveals changes in the anterior horn of one or both lateral ventricles, and at times, hydrocephalus of one or both ventricles.

2. In temporosphenoidal lobe abscess, ventriculography reveals changes in the inferior horn of the lateral ventricle, and occasionally hydrocephalus.

3. In cerebellar abscess, both lateral ventricles are normal, or there is a moderate enlargement of each ventricle.

4. In occipital and parietal lobe abscess, the test reveals changes in the body and posterior horn of the ventricle, but of course, homonomous hemianopsia, or astereognosis, would be diagnostic in such cases unless confusion arises in regard to a temporal lobe or a brain stem disturbance, then, injection of the opposite ventricle would be of material advantage.

CONCLUSIONS

1. When all other means have failed, pneumoventriculography (the Dandy air test), is of great value in the localization of subacute and chronic intracranial abscess.

2. The test is not exceedingly dangerous when made by experienced brain surgeons.

3. King's method of drainage in brain abscess offers the best chance of recovery when localization has been completed.

THE TREATMENT OF DEAFNESS BY THE "ACOUSTIC METHOD"

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The constant advance in our knowledge of electrical currents has led in recent years to their use in various forms in the treatment of disease. As a result, we are at the present time confronted with an enormous array of apparatus of all descriptions, each purported to be the very newest and most modern of its kind and represented as the remedy de luxe that will cure where other therapy has failed. The field for propaganda along this line is especially wide, when we consider the numerous ailments for which we have no specific and which in many cases are incurable. It is only natural that physicians as well as laymen should display an avid interest in these newer forms of treatment because of the impressive manner of their delivery, and because of a renewed hope in the mysterious power of that great force which is as yet not fully understood. We agree that this is proper. Science cannot progress without experiment, and knowledge cannot be gained without experience. The danger, however, lies in over-enthusiasm and lack of control in the making of these experiments, as well as in the deduction of hasty conclusions that are likely to be misleading.

THE RADIO

The radio, the audion tube and the various other new appliances for tone detection and tone amplification have recently served to stimulate our interest in the hard of hearing. Statements have been made in various quarters that the hard of hearing are being benefited through the radio, although scientific proof of these statements has been lacking. Nevertheless, because a number of patients have remarked with astonishment how well they hear over the radio, physicians as well as laymen have considered that possibly there may be some virtue in the treatment of hearing defects by means of amplified tone, and have encouraged its use. It is easy to see how a large volume of sound delivered through a head-piece by both air and bone conduction, to the exclusion of all extraneous noises, would seem to be a marvelous improvement in the hearing over its normal state and under normal hearing conditions, and would stimulate the hope in the patient's mind that this agent might cause a permanent benefit.

THE TONE AMPLIFIER

The machine which we had the privilege of trying out was built on the principle of the radio. It is, in effect, a tone amplifier. A phonograph, playing any desired record and operated by ordinary street current, passes its volume of sound through a series of amplifying tubes, reinforced by batteries and controlled by rheostats as to voltage and intensity, to a radio head-piece placed over the patient's ears so that it is possible to increase the intensity of the musical sounds even up to the point of causing pain. The theory of the treatment is that no matter how far gone the hearing apparatus may be, there is still an appreciation for sound either in the nerve apparatus or in the brain, which can be reached if the proper stimulus be applied. Thus, by increasing the intensity of the sound, we reach this threshold of audition, and by continuing the stimulus, we develop the acuity of hearing. Also the reinforced sound waves serve as a stimulant to the ossicular chain and its muscles, increasing their responsiveness to normal sounds.

These, in substance, are the claims of the manufacturers. For ourselves, we must admit that the thing is unscientific. If we are to adhere to our accepted knowledge regarding the end-organs of the nerves of special sense, we cannot possibly conceive of the development of that particular sense in any other tissue of the body. Once the end-organ is destroyed and its nerve degenerated, the special sense is lost. Yet, according to those who believe in the virtue of this apparatus, it is possible to restore the hearing in proved cases of labyrinthine deafness. As for the cases of conduction deafness, it might be possible, through the finer vibrations produced by intense sound waves, to so develop the responsiveness of the crippled chain as to make it more sensitive to normal sounds. Yet, even assuming the tenability of this theory, we find a strong objection to the treatment in the fact that daily applications of intense sounds by bone and air conduction to the delicate perception apparatus would have a tendency to impair their finer responsiveness, resulting in degeneration in the same way in which boiler makers' disease is brought about. The effects of prolonged intense auditory stimulation were thoroughly studied by Wittmaack and Yoshii, and are well known to all otologists.

All patients applying for treatment with the new apparatus were carefully tested and retested at intervals of ten days to two weeks. The final check-up was done without the original records being consulted, in order to avoid the possibility of bias through knowledge of the state of hearing in the beginning. The hearing tests being conducted by the same individual throughout, it was possible to obtain a fair idea of the results of the treatment.

Altogether, we examined forty-eight patients, all of whom began taking treatments. However, a number failed to return after the first few treatments, others came only at irregular intervals, and still others failed to appear for reexamination. As a consequence, in summarizing the series we found that only sixteen had persisted in the treatment with sufficient regularity and were properly reexamined to permit some sort of conclusions.

We present the details of these sixteen cases in the following protocols.

CASE 1.—*Diagnosis.*—Otosclerosis. A woman, aged 38, married, a laundress, had been hard of hearing for fifteen years. There was no discharge; the tinnitus was worse in the left ear; there was no vertigo or deafness in the family. The right membrana tympani was normal; the left membrana tympani was slightly opaque in spots. The patient had mild chronic rhinitis; her tonsils had been removed.

Hearing Tests in Case 1

	Before			After	
	Right	Left		Right	Left
Voice	8 inches	5 inches	Voice	6 inches	2 inches
Low tone limit	128 d.v.	140 d.v.	Low tone limit	128 d.v.	140 d.v.
High tone limit	9,000	6,900	High tone limit	9,000	6,900
Schwabach	+	+	Schwabach	+	+
Rinne	—	—	Rinne	—	—
Weber	←	..	Weber	←	..

Duration of Treatment.—Six weeks.

Average per Week.—Six treatments.

Result.—Worse for voice.

CASE 2.—*Diagnosis.*—Labyrinthine deafness. A girl, aged 9, attending school, had been deaf since the age of 2 years, following influenza. The ears discharged for nine months; both membranae tympani were retracted; there was dry pinpoint perforation behind the umbo; the tonsils and adenoids had both been removed.

Hearing Tests in Case 2

Before	After
Can distinguish vowels in loud voice only	Same as before
Hears no tuning forks or whistle	
Rotation tests negative	

Duration of Treatment.—Three weeks.

Average per Week.—Six treatments.

Result.—No change.

CASE 3.—*Diagnosis.*—Otosclerosis. A woman, aged 25, single, stenographer, had been hard of hearing for ten years. The cause was not known; there was no discharge or tinnitus; both membranae tympani were normal; the hyperemic promontory was noticeable; the nose and throat were negative.

Duration of Treatment.—Four weeks.

Hearing Tests in Case 3

	Before			After	
	Right	Left		Right	Left
Voice	8 feet	8 feet	Voice	8 feet	8 feet
Low tone limit	64 d.v.	128 d.v.	Low tone limit	64 d.v.	128 d.v.
High tone limit	14,000	14,000	High tone limit	14,000	14,000
Schwabach	+	+	Schwabach	+	+
Rinne	—	—	Rinne	—	—
Gelle	+	+	Gelle	+	+

Average per Week.—Three treatments.

Result.—No change.

CASE 4.—*Diagnosis*.—Labyrinthine deafness. A girl, aged 17, single, had a discharge from both ears in childhood, the cause of which was not known. The right membrana tympani had dry attic perforation; the remainder of drum was scarred and adherent; the left membrana tympani was scarred and adherent to promontory; the landmarks were gone.

Hearing Tests in Case 4

	Before			After	
	Right	Left		Right	Left
Voice	2 inches	C. (loud voice)	Voice	2 inches	C. (loud voice)
Low tone limit	128 d.v.	128 d.v.(?)	Low tone limit	128 d.v.	256 d.v.
High tone limit	6,200	6,200	High tone limit	5,524	5,524
Schwabach	—	—	Schwabach	?	?
Rinne	+	—	Rinne	+	—
Calorie	+	—	Calorie	+	—

Duration of Treatment.—Ten weeks.

Average per Week.—Six treatments.

Result.—Slightly worse for high tones.

CASE 5.—*Diagnosis*.—Chronic nonsuppurative otitis media. A woman, aged 23, single, a clerk, had been hard of hearing for ten years, the cause of which was unknown. There had been no discharge; the hearing had been worse since influenza last winter; both membranae tympani were retracted and opaque in spots. There was the appearance of a scar at the left posterior inferior quadrant; the nasal septum was slightly to the right.

Hearing Tests in Case 5

	Before			After	
	Right	Left		Right	Left
Voice	6 inches	8 inches	Voice	4 inches	6 inches
Low tone limit	108 d.v.	96 d.v.	Low tone limit	108 d.v.	96 d.v.
High tone limit	18,000	18,000	High tone limit	13,000	14,000
Schwabach	+	+	Schwabach	+	+
Rinne	—	—	Rinne	—	—

Duration of Treatment.—Six weeks.

Average per Week.—Five treatments.

Result.—Worse for voice and high tones.

CASE 6.—*Diagnosis.*—Nerve deafness. A woman, aged 30, single, telegraph operator; had been "deaf" in the right ear for about ten years, the cause of which was unknown. There had been no discharge, no vertigo and slight tinnitus. A slight burning sensation was felt. One cousin of the patient was also hard of hearing. The right membrana tympani was opaque and slightly retracted; mobility was fair.

Hearing Tests (Right Ear Only) in Case 6

	Before	After
Rinne	?	?
Schwabach	Diminished	?
Low tone limit	No forks heard	C4
High tone limit (Galton)	Response uncertain	13,000
Voice	Contact	8 feet
	(Barany noise apparatus in left ear)	
	Left ear normal; not treated	

Duration of Treatment.—Nine weeks.

Average per Week.—Five treatments.

Result.—Improvement for voice, low and high tones.

Note: The Barany noise apparatus was used at the first examination, and the fact was discovered only after the final check-up and the patient had already gone away. This, no doubt, accounts in large measure for the marked improvement registered.

CASE 7.—*Diagnosis.*—Chronic adhesive otitis media. A schoolboy, aged 14, had impaired hearing in the left ear for several months and a discharge was noted in February, 1924, lasting for "one-half hour." The left membrana tympani was retracted and its mobility impaired; the nose and throat were negative. (This patient had nine roentgen-ray treatments without result.)

Hearing Tests in Case 7

	Before			After	
	Right	Left		Right	Left
Whisper	10 feet	3 feet	Whisper	15 feet	6 feet
Low tone limit	24 d.v.	36 d.v.	Low tone limit	20 d.v.	24 d.v.
High tone limit (Galton)	16,000	16,000	High tone limit (Galton)	18,000	18,000
Schwabach	+	+	Schwabach	+	+
Rinne	—	—	Rinne	—	—

Duration of Treatment.—Five weeks.

Average per Week.—Six treatments.

Result.—Improvement for voice, low tones and high tones.

CASE 8.—*Diagnosis.*—Chronic adhesive otitis media. A woman, aged 34, single, a milliner, had been hard of hearing for many years. She had had scarlet fever at the age of 14. She heard grinding noise in the right ear and hears better in the presence of noises; there was no deafness in the family; both membranae tympani were retracted and atrophic below the umbo; the tubes were obstructed; the nose and throat were negative.

Hearing Tests in Case 8

	Before			After	
	Right	Left		Right	Left
Voice	2 to 4 feet	2 to 4 feet	Voice	1 foot	1 foot
Low tone limit	64 d.v.	64 d.v.	Low tone limit	128 d.v.	64 d.v.?
High tone limit	17,000	17,000	High tone limit	17,000	15,000
Schwabach	+	+	Schwabach	+	+
Rinne	—	—	Rinne	—	—

Duration of Treatment.—Three weeks.

Average per Week.—Five treatments.

Result.—Worse for voice and low tones. Worse for high tones left ear.

CASE 9.—*Diagnosis.*—Labyrinthine deafness. The patient, a schoolboy, aged 9, had been deaf since early childhood; he had had a discharge in the right ear off and on for the past three years. The tonsils and adenoids were removed five years ago; the right membrana tympani had a small central perforation with scanty discharge. The left membrana tympani was normal.

Hearing Tests in Case 9

Before	After
Hears loud voice at contact. Cannot distinguish more than vowels	Can distinguish names of a few familiar objects in loud voice
Hears loud C_2 and C_3 and Galton whistle up to 6,000 in islands	Other tests show no change
Rinne and Schwabach uncertain	
Rotation tests elicit no response	

Duration of Treatment.—Five weeks.

Average per Week.—Six treatments.

Result.—Doubtful improvement for voice.

CASE 10.—*Diagnosis.*—Otosclerosis. A woman, aged 41, married, living at home, had been hard of hearing for fifteen years, the cause of which was unknown. There had been no discharge. Tinnitus but no vertigo; one uncle was hard of hearing. Both membrana tympani were slightly more transparent than normal; the right seemed thinner. The septum was to the right. The throat was normal.

Hearing Tests in Case 10

	Before			After	
	Right	Left		Right	Left
Voice	6 feet	8 feet	Voice	5 feet	6 feet
Low tone limit	256 d.v.	128 d.v.	Low tone limit	190 d.v.	128 d.v.
High tone limit	15,000	15,000	High tone limit	15,000	15,000
Schwabach	+	+	Schwabach	+	+
Rinne	—	—	Rinne	—	—
Gelle	+	+	Gelle	+	+

Duration of Treatment.—Five weeks.

Average per Week.—Five treatments.

Result.—Slightly worse for voice. Slight improvement for low tones in right ear.

CASE 11.—*Diagnosis.*—Otosclerosis. A man, aged 54, married, a machinist, had been hard of hearing for thirty-five years, with no discharge. The patient had tinnitus years ago but no vertigo; both membrana tympani were normal; in the nose, mild chronic rhinitis was noted; the throat was negative.

Hearing Tests in Case 11

	Before			After	
	Right	Left		Right	Left
Voice	6 inches	2 inches	Voice	6 inches	3 inches
Low tone limit	128 d.v.	190 d.v.	Low tone limit	128 d.v.	190 d.v.
High tone limit	5,524	12,000	High tone limit	5,524	10,000
Schwabach	+	+	Schwabach	+	+
Rinne	—	—	Rinne	—	—

Duration of Treatment.—Five weeks.

Average per Week.—Four treatments.

Result.—Slightly worse for high tones in left ear.

CASE 12.—*Diagnosis.*—Otosclerosis. A woman, aged 38, married, living at home, had been hard of hearing since childbirth (ten years ago [?]); both membranae tympani were normal.

Hearing Tests in Case 12

	Before			After	
	Right	Left		Right	Left
Voice	5 inches	8 inches	Voice	6 inches	8 inches
Low tone limit	64 d.v.(?)	64 d.v.(?)	Low tone limit	64 d.v.(?)	64 d.v.(?)
High tone limit	6,960	13,000	High tone limit	6,960	13,000
Schwabach	+	+	Schwabach	+	+
Rinne	—	—	Rinne	—	—

Duration of Treatment.—Seven weeks.

Average per Week.—Six treatments.

Result.—No change.

CASE 13.—*Diagnosis.*—Nerve deafness. The patient, aged 13, a schoolboy, had been deaf in the right ear for "two months." There was no discharge; both membranae tympani were normal; the tonsils were enlarged.

Hearing Tests (Right Ear Only) in Case 13

	Before	After
Voice	10 inches	12 inches
Low tone limit	256 d.v.	190 d.v.
High tone limit (Galton)	15,000	16,000
Schwabach	?	?
Rinne	±	±
Weber	To left	To left

Duration of Treatment.—Eight weeks.

Average per Week.—Six treatments.

Result.—Slight improvement.

CASE 14.—*Diagnosis.*—Nerve deafness. A man, aged 55, married, had had poor hearing for fifteen years. There were no discharge and no tinnitus; both membranae tympani had slight opacities.

Hearing Tests in Case 14

	Before			After	
	Right	Left		Right	Left
Voice	4 feet	12 feet	Voice	4 feet	15 feet
Low tone limit	20 d.v.	20 d.v.	Low tone limit	24 d.v.	24 d.v.
High tone limit	15,624	4,138	High tone limit	14,300	4,138
Schwabach	—	—	Schwabach	—	—
Rinne	+	+	Rinne	+	+

Duration of Treatment.—Eight weeks.

Average per Week.—Five treatments.

Result.—Slightly worse for low tones in both ears and for high tones in right ear. Slightly improved for voice in left ear.

CASE 15.—*Diagnosis.*—Chronic adhesive otitis media. Nerve degeneration. A woman, aged 22, single, living at home, had been hard of hearing since the age of 5, following measles. The patient had tinnitus but no vertigo; both membranae tympani were retracted and atrophic; the nose and throat were negative.

Hearing Tests in Case 15

	Before			After	
	Right	Left		Right	Left
Voice	18 inches	18 inches	Voice	12 inches	12 inches
Low tone limit	128 d.v.	160 d.v.	Low tone limit	64 d.v.(?)	64 d.v.(?)
High tone limit	15,000	15,000	High tone limit	15,000	15,000
Schwabach	—	—	Schwabach	—	—
Rinne	+ (?)	+ (?)	Rinne	?	?

Duration of Treatment.—Four weeks.

Average per Week.—Four treatments.

Result.—Worse for voice, Doubtful improvement for low tones.

CASE 16.—*Diagnosis.*—Otosclerosis. A woman, aged 52, married, had been hard of hearing for many years, the cause of which was unknown. There had been no discharge; tinnitus was present. Both membranae tympani were normal, except slightly more transparent; the nose and throat were negative.

Hearing Tests in Case 16

	Before			After	
	Right	Left		Right	Left
Voice	2 inches	C. (loud voice)	Voice	1 inch	C. (loud voice)
Low tone limit	128 d.v.	256 d.v.	Low tone limit	128 d.v.	256 d.v.
High tone limit	14,000	15,000	High tone limit	5,000	14,000
Schwabach	+	+	Schwabach	+	+
Rinne	—	—	Rinne	—	—
Gelle	?	+	Gelle	?	+

Duration of Treatment.—Seven weeks.

Average per Week.—Five treatments.

Result.—Worse for voice. Much worse for high tones in right ear.

SUMMARY

Nerve and Labyrinth Cases.—Total, 6; improved, 1; worse, 1; no change, 2; doubtful, 2.

Otosclerosis.—Total, 6; improved, 0; worse, 4; doubtful, 2.

Conduction Deafness.—Total, 4; improved, 1; worse, 3.

CONCLUSIONS

In a total of sixteen patients, two were improved, eight were worse, two showed no change and four were doubtful. The percentage of cases improved is no greater than that which can be obtained by any of the

older methods of treatment, and is equivalent to the usual benefit which comes in the early stages of treatment with a new apparatus. Whether or not this improvement is permanent, time alone can tell.

The percentage of patients who were made worse is high, and considering the fact that most of them show a lowering of the high tone limit, we are forced to conclude that there is danger of permanently damaging the acoustic apparatus through the prolonged irritation by the loud sounds which the machine conveys.

25 East Washington Street.

TUBERCULOSIS OF THE UPPER RESPIRATORY TRACT *

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Probably no disease is so widely distributed in the body and of so variable a gravity as tuberculosis. At times it is easily conquered and at others rapidly fatal. The early recognition of the disease and the application of the best known methods of control will enable most patients to recover. It is most important, however, that it be recognized, especially by those who undertake to treat one portion of the body, that the patient has tuberculosis, not merely of the larynx, the lymph nodes or wherever the obvious lesion is found. With the upper respiratory tract, particularly the larynx, the finding of a tuberculous lesion is almost positive proof, notwithstanding other negative findings, that the lungs are also involved and are important to treat.

I shall endeavor to cover the more usual forms of tuberculosis of the upper respiratory tract, with particular emphasis on that prevalent and serious complication of pulmonary tuberculosis, namely, tuberculosis of the larynx.

THE NOSE

The nose is rarely involved in cases of tuberculosis except in the form of lupus, which I shall not endeavor to cover at this time. Chronic suppurative sinusitis was at one time considered tuberculous, but actually this is not true.

EARS AND MASTOID

The ears and mastoid are occasionally subject to tuberculous inflammation, especially in children, and often show little to differentiate tuberculous from nontuberculous inflammation. Histologic evidence of tuberculosis was found in a larger proportion than was suspected clinically, in a series of operations for chronic mastoiditis. The chief points leading one to suspect presence of the disease in the ear are painless and multiple perforations of the drum, a chronic serosanguineous discharge and early loss of the ossicles. Sequestrums, involvement of the parotid lymph nodes and early facial paralysis are common.

THE PHARYNX

The pharynx maye be involved by two entirely different processes. Fortunately, the most common has not very grave significance, but is difficult to recognize clinically. About 3 per cent. of all tonsils and adenoids removed in children show tuberculosis histologically but not clinically. On the other hand, 95 per cent. of clinically recognizable

* Read before the Saranac Lake Medical Society, Jan. 7, 1925.

tuberculosis of the cervical lymph nodes show tuberculosis also in their tonsils and adenoids. Stiles of Edinburgh has made a careful study of this question, which is more serious in Scotland than with us, and attribute it to tuberculous milk rather than to human infection. Removal of the tonsils and adenoids of all persons suffering from tuberculosis of the cervical lymph nodes is advisable, whatever treatment may seem best suited for the lymphadenitis of the particular case.

The other form of tuberculosis of the pharynx seen is the usually superficial "mouse nibbled" ulceration, sometimes associated with rapid and advanced pulmonary or miliary tuberculosis. This is painful and not amenable to any curative treatment. Dusting the ulcers with equal parts of orthoform and stearate of zinc somewhat allays the agony of swallowing usually present in such a condition. The tongue is involved secondarily in about 1 per cent. of the cases, usually in the anterior part. Occasionally primary nodules or ulcers are formed and these have been reported cured by excision rather than by treatment. The lips may also be involved. These lesions are generally only a part of an extensive tuberculosis, with a bad prognosis.

THE LARYNX

We now come to the larynx, the most frequently involved and important site of tuberculosis of the upper respiratory tract. I feel that no one should undertake to treat tuberculosis who is not competent to make an adequate indirect examination of the larynx or who has not the constant cooperation of a person so trained.

The frequency and importance of this type of invasion may best be indicated by quoting some statistics from an admirable study of the question by St. Clair Thomson.[1] He found laryngeal involvement in 18.7 per cent. of 2,541 patients admitted to the sanitarium at Midhurst, England, and in 40.8 per cent. of the advanced cases. Pottenger [2] reported 63 per cent. laryngeal involvement in far advanced cases, and Fetterhof found 83 per cent. laryngeal involvement in necropsies on victims of the disease. Thomson observes that the incidence of laryngeal involvement seems diminishing, finding 29 per cent. involved in 1911 to 1912, and 15 per cent. in 1920 to 1921. Less than 2 per cent. of the patients admitted without laryngeal involvement developed it during their stay in the sanitarium. He attributes this to better care in recent years.

The seriousness of laryngeal involvement in persons with pulmonary tuberculosis is indicated in these figures for all stages of the disease. Of the fatal cases, 37.5 per cent. had a normal larynx and in 70.6 per cent. the larynx was diseased. In Group I, mild cases, 17.4 per cent. of those

1. Thomson, St. Clair: Tuberculosis of the Larynx, London, His Majesty's Stationery Office, 1924.
2. Pottenger, F. M.: California State J. M. **6**:333, 1908.

with a normal larynx and 50 per cent. of those with diseased larynx succumbed. In Group II, decided cases, 39.1 per cent. of those with a normal larynx and 66.4 per cent. of those with a diseased larynx died. In the advanced cases of Group III, 57.7 per cent. of those with a normal larynx and 77.3 per cent. of those with a diseased larynx died.

PATHOLOGY

The pathology differs little from that found elsewhere in the body—an infiltration, tubercle formation, granuloma or ulcer formation. The primary site is practically always in the posterior commissure, that is, in the loose tissue between the arytenoids, which is subject to most movement and trauma in speech and respiration, and is the location of collections of infected sputum coming up from below. The earliest changes are hard to recognize clinically. Casselberry [3] emphasizes a mammillated infiltration at the vocal angle, that is, the anterior and inner angle of the arytenoid cartilage. This may extend forward along one or both vocal cords or ventricular bands, and tuberculosis, like syphilis or cancer, is apt to affect one cord more than another in contradistinction to the symmetrical thickening of simple laryngitis. A heaped up granuloma is likely to follow in the posterior commissure,at times becoming rather large without much ulceration or extension. More often an infiltration of the arytenoids and a typical pale, edematous, pear-shaped swelling of the aryepiglottic fold follows, with more or less ulceration as it progresses. The epiglottis may next be attacked, first with infiltration, producing a thick, so-called turban-shaped epiglottis, and more or less ulceration is likely, even to its destruction. At this stage the pharynx also is apt to be involved. Typical of tuberculosis is the pallor present in most of its lesions with the rest of the larynx not grossly involved. This is in contradistinction to all other lesions found there. It is not merely dependent on the anemia often present in the person, but is more marked than the pallor then found in the cheeks and palate.

There is another less common and more serious type of invasion of the larynx in which the parts are usually injected, and tiny elevations, often with yellowish centers, are found scattered throughout, especially on the epiglottis. These are fresh tubercles and occur with a general miliary invasion. At times their appearance in the larynx is the first evidence of the disease.

SYMPTOMS

The symptoms vary, depending largely on the location and extent of the lesion. At times, none are noted; at others, only a little effort on speaking and easy tiring on use of the voice. Then a slight persistent hus-

3. Casselberry, W. R.: The Recognition of Early Changes in the Larynx in Tuberculosis, J. A. M. A. **60**:1789 (Nov. 15) 1913.

kiness appears, more apparent late in the day. This may become marked, especially in the slow type with granuloma formation. When, however, the disease goes beyond the strict confines of the larynx, new and more distressing symptoms develop, from a slight sense of fulness and effort in swallowing to the agonizing pain present with ulceration of the epiglottis and pharynx. This pain at times radiates to the ears, and brings on prompt emaciation from voluntary starvation. Diagnosis is at times difficult, the chief points to remember being pallor, involvement of one cord, arytenoid edema, the turban-shaped epiglottis, and, most important, the presence of pulmonary tuberculosis. No known tuberculous patient should be treated without examination of the larynx, regardless of symptoms, and every person with persistent huskiness should have a careful examination of the chest, including sputum and roentgenograms. Pottenger has noted a diagnostic hyperemia of the larynx following the use of tuberculin hypodermically. Tumors, malignant or benign, syphilis or chronic laryngitis are often present, especially in the winter and in elderly people, may offer difficulties at times, and may, of course, occur in a tuberculous patient. These may, however, by the aid of serologic or therapeutic tests, or even of biopsy, if necessary be ruled out.

PROGNOSIS

Prognosis in these cases depends a great deal on the pulmonary lesion and the care they receive. The very presence of a laryngeal lesion makes the prognosis more grave. However, the prognosis today is much better than it was twenty years ago, partially because more early cases are recognized and partly because present-day treatment is more effective. At one time no hope whatever was offered, and for this reason many sanitariums exclude patients showing laryngeal involvement—a most unfair rule. Chappel [4] reported patients cured in 1898, and Pottenger,[2] Levy [5] and an increasing host of others followed, until today the prognosis in most patients is considered fair if thorough and sufficient care is taken. The chief danger is that improvement will encourage the patient to return to his home and occupation too soon, and the almost inevitable recurrence is not so easily overcome. Coakley [6] thinks a minimum of six months'—or, better, a year's—treatment is necessary.

TREATMENT

Treatment, of course, varies with the extent and severity of the lesions of both the larynx and the lungs. Various methods have been in vogue. At one time, when only the gravest lesions were recognized, surgical treatment—curetting and applications of various sorts, particu-

4. Chappel: Report Loomis Sanitarium, New York M. S. **168**:368, 1898.

5. Levy, Robert: Laryngeal Tuberculosis, New York M. J. **90**:487 (Sept. 11) 1909.

6. Coakley, C. S.: Tuberculosis of the Larynx, Bull. New York Tuberculosis Assn. **4**:1 (July) 1923.

larly lactic acid—was popular. The results, however, were invariably bad. Now, almost the only places surgery has kept in the treatment of tuberculosis of the larynx are in the excision of a badly ulcerated epiglottis to relieve dysphagia and of large granulomas in the posterior commissure in slowly developing cases. The last is helpful in removing a mechanical interference to both speech and respiration. Thomson [1] feels that benefit may be obtained from the judicious use of the galvanocautery for puncture of infiltrated areas. In this country, however, the best results are obtained by, first and most important, early recognition and proper sanitarium care for the pulmonary lesion. Locally, nothing can replace absolute cessation from talking. Communication by writing is best, but many do well who whisper, and by this I mean use of the tongue and lips with no use of the larynx at all. The hyperemia following the use of tuberculin subcutaneously, Pottenger believes, is helpful. A valuable adjunct is sunlight, either natural or artificial. The sun's rays must be reflected into the larynx by a mirror, without glass over the reflecting surface as this will absorb the most beneficial rays. Patients may be taught to do this for themselves. I have seen patients whose larynx was badly infiltrated, and who, to all appearances, have been normal after the use of the sun's rays. Mayer [7] has studied the question of light therapy in tuberculosis very carefully and has demonstrated its value in many tuberculous lesions. The hopeless cases, with the agonizing pain and dysphagia accompanying extensive ulceration, are sometimes greatly relieved by an injection of alcohol into the superior laryngeal nerve. Cocain is far less efficacious than would be supposed. Orthoform, especially when mixed with stearate of zinc which causes it to adhere to the ulcerated surface, seems the most useful local anodyne, but it seems only proper to give sufficient morphin to make the few remaining days of these unfortunate patients tolerable.

CONCLUSION

In conclusion, I wish to emphasize the fact that by far the most common and important tuberculous lesion of the upper respiratory tract is in the larynx. No tuberculous patient should fail to have his larynx watched, and no persistent laryngitis should fail to impress the physician with the importance of a careful examination of the patient's lungs. If tuberculosis is present, nothing can compare with proper sanitarium care for the general infection and absolute rest of the voice for from six months to a year. Realization of this has saved many patients untold suffering in the past two decades and a more universal realization of it should save suffering on the part of many more.

53 West 56th Street.

7. Mayer, Edgar: Artificial Light Therapy in Tuberculosis, J. A. M. A. **82**:1920 (June 14) 1924.

MASKED MASTOIDITIS SIMULATING "ALIMENTARY INTOXICATION" (ANHYDREMIA)*

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During the last eighteen months, twenty-six babies with mastoid infection have come under our observation. The condition was manifested by severe and sudden gastro-intestinal disturbance, marked and rapid dehydration with rapid losses in weight, extreme toxicity, and in a few of them death within a few hours from onset. Since the symptoms presented were those of severe diarrhea, and the otologic findings on examination were either negative or of a mildly suspicious nature, interest is centered on these two. Treatment such as was used on these particular patients will be pointed out. Special attention is called to the suspicion that a great many babies who have died with the symptoms herein described may have succumbed to a mastoid infection instead of to "cholera infantum" or infectious diarrhea.

Most of the patients in this report were healthy babies, normal feeding cases, while the remainder were under treatment for minor ailments, such as upper respiratory infections. One patient was marantic; twenty-two were ward patients, some of whom had been in the institution long enough to be hospitalized, while the remainder in the group had been under observation from a few hours to a few days. Three developed the identical symptoms in their respective homes. The age range was from 8 weeks to 15 months, the greatest number being around 6 months. The older infants presented practically the same symptoms and were just as ill.

Unfortunately, the condition of the earlier patients was diagnosed at necropsy. These children died presenting symptoms of severe cholera infantum or diarrhea, with intoxication as described by Finkelstein. At necropsy, nothing could be demonstrated in the visceral organs or brain to show cause for the illness. Physical and laboratory methods of diagnosis were utilized to locate an infection, without avail. Central pneumonia and pyelitis, known to be elusive, could not be demonstrated. The ears were examined for otitis as a routine measure, and, although suspected, practically all the reports showed absence of tympanic findings, as pointed out by others [1] with unusual mastoid cases, a lack of luster or a slightly pink color to the drum with no bulging.

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* From the Department of Pediatrics, College of Medicine, State University of Iowa.

* The majority of the cases noted in this article were observed during the period in which Dr. A. H. Byfield was head of the Department of Pediatrics, College of Medicine, State University of Iowa.

1. Wilson, W.: Two Unusual Cases of Mastoiditis in Children, Brit. M. J. **2**:398 (Aug. 29) 1924. Kerrison: Mastoid Abscess Without Aural Discharge, Ann. Otol., Rhin. & Laryngol. **28**:949, 1919.

As previously mentioned, no visceral or brain necropsy findings were demonstrable. The brain cavity presented no abnormality about the inner ear, but when the mastoids were opened, bilateral mastoiditis was marked. Pus, too thick to flow, was tucked away in the mastoid antrum, usually under pressure. Of the later patients in this series, a few, however, showed a slight redness of the drum and, on incision, only a little blood or bloody fluid escaped. In a few, a sagging of the posterior-superior canal wall was observed, recognized as being indicative of pus in the mastoid antrum.[2] None of the patients showed otorrhea. This has already been mentioned by Steinsleger,[3] who, in his series of atypical mastoid cases, found that 77 per cent. had none.

L. W. Dean,[4] who has observed a considerable number of these cases, believes that a lack of tympanic or of canal findings is due to incomplete observation. He states that when mastoiditis is present there are always changes on the canal wall or drum.

SYMPTOMS

Lethargy and dehydration, both usually beginning at once or the former followed rapidly by the latter, mark the onset. There is an indication of some general constitutional disturbance,[5] usually gastro-intestinal or nutritional, already mentioned by Byfield [6] and Hartmann [7] in their investigations of otitis media of infants. Fever is present. The child loses all interest in everything, including his feeding; usually, constant arousing or the shaking of the nipple in his mouth is required to keep him nursing; often food is refused and, if forced, is immediately regurgitated. The face is expressionless, and the protective eyelid reflex is lost or markedly sluggish. As the condition advances, the face suggests extreme exhaustion, the eyes become sunken, and a shadow appears below each lower lid. These have been constant observations. No crying or suggestion of an earache is present. Closely following the lethargy or accompanying it, the stools become loose and frequent. Invariably they contain clear, glairy mucus, which at times is so great as to compose almost the entire stool. The usual number of stools is from eight to

2. Jones, W. D.: Two Atypical Cases of Acute Mastoiditis, Texas State J. Med. **16**:123 (July) 1920. Phillips, Wendell C., and Friesner, Isidore: Report of Five Cases of Mastoiditis with Atypical Symptoms, J. A. M. A. **78**:1796 (June 10) 1922.

3. Steinsleger, M: Mastoiditis in Infants, Riv. Med. del Rosario. **9**:29 (March) 1919; abst. J. A. M. A. **72**:1503 (May 17) 1919.

4. Dean, L. W.: Personal communication to the author.

5. McDougall, J. C., and Knauer, W.: Five Atypical Cases of Mastoiditis in Children, Laryngoscope **33**:936 (Dec.) 1923.

6. Byfield, A. H.: Section on Systemic Effects of Chronic Infection of the Upper Respiratory Tract, Abt's Pediatrics, **3**:786.

7. Hartmann, Arthur: On the Intestinal Disturbances Produced by Otitis Media in Infants, Arch. Otol. **28**:126, 1899.

fifteen in twenty-four hours. They are liquid but not watery. Usually there is a residue. The number changes suddenly from one or two to many in a day. The number during the day usually equals that of the night. If Ringer's or physiologic sodium chlorid solution is administered by needle, the stools become watery and a striking increase in number follows. Frequently they are noisy, due to gas, foul smelling and pungent. The gastro-intestinal condition does not respond to dietary rearrangement.

Dehydration also is present from the onset, usually being demonstrable as early as the lethargy by a lag in the elasticity of the skin over the abdomen when pinched up between the thumb and forefinger. The course is so rapid that within an hour an increase in the dehydration is noted. A point of interest is that, in spite of the repeated and persistent giving of fluids by any method, the tissues continue to dehydrate and the baby loses weight greater in amount than the fluid given; the weight chart may show from 3 to 9 ounces (from 85 to 255 gm.) loss over night, even though the room is kept humid. The eyes become more and more sunken and the dark shadow more pronounced until, if he lives, the infant may become almost a living skeleton. The leukocyte count will range from 11,000 to 18,000.

TREATMENT

After experiences with those patients who died after every effort was made to save them, and because pus was found in each mastoid antrum at necropsy, the conclusion was drawn that the patients presenting the foregoing symptoms should be subjected immediately to bilateral mastoidectomy after other causes were quickly eliminated. No half-way measures were attempted. Drum incisions were without benefit, as they did not drain. After preliminary supportive treatment, usually 5 per cent. glucose solution given subcutaneously, bilateral mastoidectomy was performed, pus was found and evacuated, and, in those cases not too far advanced, the patient made a surprisingly rapid recovery. The question at once arises: Which mastoid shall be opened? If in doubt, the answer here would be both (since only one patient in this series gave negative findings on one side). Certainly when the condition is so grave that no hope for recovery can be held, a bilateral operation is justifiable, especially if pus is found on the side on which operation was first performed. If pus is not found on that side, great probability exists that it will be found in the opposite mastoid antrum.

CASE REPORT

History.—A. M., a girl, aged 12 weeks, had been admitted nine weeks previously for normal feeding. Physical examination was negative and the leukocyte count at that time was 8,900. As soon as the feedings were adjusted, this infant throve, gaining from 30 to 50 grams daily, except for a seven day

period of acute diarrhea, prevalent simultaneously among other infants in the same ward. Yet during these seven days she gained a total of 150 grams. The number of stools then ranged between five and nine a day, and her temperature ranged from 98.8 to 100.4 F. (rectal). There was neither dehydration nor subjective indications of an illness and recovery was complete, the number of stools becoming three per day and the weight increasing again. When 10 weeks old, her weight dropped for three successive days, followed by a rise on the fourth with no cause found except some snuffling. There was no increase above normal in the number of stools.

On the fifth day, however, a sharp loss in weight of 260 grams occurred, ten stools were passed, and it was noticed that the patient was a little listless. Next day there were thirteen stools and a weight loss of 170 grams. Dehydration was quite noticeable, especially in the skin over the abdomen, and the eyes were becoming sunken. Fluids were administered intraperitoneally, intravenously and hypodermically. The next day (third day of manifesting symptoms), the weight was 250 grams less, although Ringer's and glucose solutions had been administered in abundance. Dehydration became marked. The temperature rose to 104 F. and the leukocyte count was 18,000. The patient was stuporous. The otologist reported a slight sagging or bulging about the posterior-superior quadrant of one ear drum membrane, otherwise the findings were negative. The other ear was negative on examination. Bilateral mastoidectomy was performed and pus drained from each mastoid antrum. Improvement was rapid. Next day the temperature had dropped to 99 F. and continued to be normal. Gain in weight with disappearance of the dehydration began simultaneously. At the end of five days 470 grams had been regained, and at the end of two weeks the child weighed 260 grams more than the last weight before her illness.

SUMMARY

1. Certain infants, usually between the ages of 8 weeks and 18 months, may suddenly develop symptoms suggesting a primary gastro-intestinal disturbance resembling the alimentary intoxication described by Finkelstein.

2. The symptoms are all marked, being lethargy, frequent and loose stools and dehydration, with great and rapid losses in weight in spite of symptomatic and supportive treatment. The bowel condition does not respond to diet rearrangement.

3. At necropsy, the only positive finding was pus in the mastoid.

4. Mastoiditis is masked, the symptoms being those of a severe gastro-intestinal or nutritional disorder.

5. Bilateral mastoidectomy performed as soon as the condition is determined and other foci eliminated has resulted in prompt recovery of many of these infants and is probably the only means of saving the child's life.

EXOPHTHALMOS AS A COMPLICATION OF NASAL SINUSITIS *

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Exophthalmos due to nasal sinus disease is invariably unilateral. The most frequent cause of unilateral exophthalmos is suppurative sinusitis. The most common orbital complication of sinusitis is orbital cellulitis and abscess, which is usually the result of frontal or ethmoid sinusitis, involving the former in adults and the latter in children. It is also noteworthy that while suppurative nasal sinusitis is relatively common, yet the incidence of orbital phlegmon is infrequent and exophthalmos is rare.

To determine the incidence of suppurative sinusitis, orbital phlegmon and exophthalmos, the available reports of the Illinois Eye and Ear Infirmary for the last ten years were examined. Three hundred and fifty-seven cases of empyema of the accessory nasal sinuses which were involved as follows were recorded: frontal, 45 per cent.; maxillary, 28 per cent.; ethmoid, 24 per cent., and sphenoid, 3 per cent. Of 150 cases of orbital phlegmon, 146 were recorded as orbital cellulitis and four as orbital abscess. Empyema of the nasal sinuses was about two and one-half times as frequent as orbital phlegmon. There were thirty-seven cases of exophthalmos recorded, but they were not classified as to etiology. Orbital phlegmons were four times and empyemas of the nasal sinuses were ten times as frequent as exophthalmos.

Exophthalmos secondary to nasal sinus disease may be caused either by a pathologic increase in the volume of the orbital contents, the size of the orbit being normal as in orbital phlegmon; or, by a pathologic diminution in the size of the orbit, the volume of the orbital contents being normal, as the encroachment on the orbital cavity by a mucocele or pyocele of the frontal or ethmoid sinuses.

The following is a summary of seven cases of exophthalmos secondary to nasal sinus disease (six were observed at Cook County Hospital and one in private practice), in which the diagnosis was corroborated by roentgen ray or by operation or by both. The frontal sinus was involved in six cases and the ethmoid in five cases; the frontal, ethmoid and maxillary sinuses were involved coincidentally in three cases. There was one cases of giant mucocele of the frontal sinus with absorption of the floor of the sinus from pressure necrosis. There were three cases of acute sinusitis and four of chronic sinusitis. In children the sinusitis was acute, while in adults it was chronic. The onset occurred after acute

* Read before the Chicago Ophthalmological Society, Feb. 16, 1925.

rhinitis in three cases. There was a history of nasal stoppage in two, of nasal discharge in two, and of previous swelling of the orbit and lids in two cases. Pus was observed rhinoscopically in but one case. A supra-orbital swelling was present in four cases, fluctuation in one and tenderness over the frontal sinus in two cases. Limitation of ocular movement was present in five cases, edema of the lid (upper) in five cases and chemosis in two cases. Ophthalmoscopic examination was negative. Four patients recovered and three died. Complications were meningitis, extradural abscess, sphenotemporal lobe abscess, frontal lobe abscess and serpens ulcer of the cornea.

ANATOMY

The accessory nasal sinuses surround the orbit except on its temporal aspect. The nasal wall of the orbit is the thinnest, and is formed by the lamina papyracea of the ethmoid and the lachrymal bone. The superior wall is formed by the frontal bone which forms the floor of the frontal sinus. The inferior wall is formed by the orbital plate of the maxilla which forms the roof of the maxillary sinus. The sphenoid sinus is the only one of the nasal sinuses that does not participate in the formation of the bony wall of the orbit. The bony wall of the orbit is lined with a thin periosteum, the periorbita. No lymph vessels or lymphatic glands are contained in the orbital cavity. The rich vascular anastomoses between the nasal sinuses and the orbit predispose to the transference of the infectious processes from the nasal sinuses to the orbital cavity.

The ethmoid, sphenoid and maxillary sinuses are present at birth; the frontal sinus appears as a distinct cavity separated from the anterior ethmoid cells at the seventh year; the nasal sinuses do not reach full development until about the fifteenth year.

MODE OF INFECTION

The mode of infection of the orbit from nasal sinus disease may be from necrosis in the common bony wall of the nasal sinus and the orbit, or from a thrombophlebitis of the veins of the diseased nasal sinus; other causes, such as dehiscence and trauma following operations on the nasal sinuses, are rare. The spread of infection into the orbital cavity by the lymphatic route can be excluded because of the absence of lymphatic vessels and glands. The sphenoid and maxillary sinuses are rarely the direct cause of orbital complications, because the wall of the sphenoid sinus is not in direct communication with the wall of the orbit, and the orbital wall of the maxillary sinus is rarely involved in disease of the maxillary sinus.

From the standpoint of the surgical pathology found as a result of orbital exploration, we may divide these cases into two groups: (1) cases in which a demonstrable pathologic connection between the

nasal sinuses and orbit is present, as an area of bone necrosis in the bony orbitosinus wall, subperiosteal abscess, mucocele or pyocele of the frontal or ethmoid sinuses, etc., and (2) cases in which no demonstrable pathologic connection can be found. In the latter group, if associated with sinusitis, the apparent absence of incriminating surgical evidence is insufficient to exclude the nasal sinuses as a causative factor, because infection through the small veins common to the sinuses and the orbit via thrombophlebitis cannot be excluded.

A syphilitic periostitis or gumma of the naso-orbital wall may produce a rarifying osteitis and lamellar absorption of the bone, thereby causing a hiatus in the bony wall which establishes a direct communication between the orbital and nasal cavities which predisposes to infection being transmitted from the nasal sinus directly into the orbital cavity. Syphilis is not infrequently associated with suppurative sinusitis, orbital phlegmon and exophthalmos.

SYMPTOMATOLOGY

The symptomatology of exophthalmos due to nasal sinus disease may be divided clinically into two groups, namely, the inflammatory or phlegmonous and the noninflammatory or neoplastic.

1. The inflammatory or phlegmonous type is associated with signs and symptoms of phlegmon, such as rubor, calor, dolor, tumor, etc., as in orbital cellulitis and abscess. It occurs more frequently than the noninflammatory type, and is the result of acute or an acute exacerbation of a chronic sinusitis. The onset is sudden with acute and stormy symptoms of infection, constitutional and local, as chill, fever, leukocytosis, prostration, intense pain in the eyeball radiating from the orbit. A rather sudden exophthalmos develops, with outward and forward displacement of the globe, with limitation of ocular movement in one or more directions or with complete immobility of the globe. This may be accompanied by diplopia and a reduction of visual acuity. There are local signs of inflammation present, such as edematous swelling of the upper eyelid, chemosis and localized swelling at the upper inner quadrant of the orbit which is tender to palpation. The eyeball also may be exquisitely tender. The course of the disease is acute; the symptoms develop rapidly, so that the height of the symptoms occur at the end of the first week, or sooner. The presence of a fistulous tract, which may or may not be discharging pus, or the presence of a healed fistula in the upper eyelid signifies a necrosis of the bony wall of the frontal sinus.

2. Noninflammatory or neoplastic type, that is, that which occurs with mucocele or pyocele of the frontal or ethmoid sinuses and which is characterized by a gradual onset, without any signs of phlegmon, a chronic course, with gradual development of exophthalmos and disloca-

tion of the eyeball, unaccompanied by pain or sensitiveness. By deep palpation, a circumscribed globular swelling may be felt, arising along the floor of the frontal sinus or the lamina papyracea of the ethmoid. Deep pressure on the mucocele or pyocele may cause mucus or pus to appear in the nasal cavity. The exophthalmos may be intensified by an attack of acute rhinitis. Forceful blowing of the nose may exaggerate the exophthalmos or the tumefaction (mucocele or pyocele) in the orbit. When the exophthalmos and associated displacement of the globe with limitation of ocular movement is marked, and has extended over a long period of time and the globe cannot be compressed into the orbital cavity, there is usually marked diminution of visual acuity from pressure on the globe and the optic nerve. These cases may be difficult to differentiate from benign orbital neoplasms.

The ocular signs of orbital tumefactions depend largely on the location of the latter within the orbital cavity. In a general way, the mechanical effect of pressure within the orbit is in the opposite direction of the source of the pressure. In exophthalmos due to inflammatory and noninflammatory orbital complications of nasal sinus disease, the position of the proptosed eyeball is usually an indication of the nasal sinus involved. The direction of the dislocation of the globe from frontal sinus disease is forward, outward and downward; from the anterior ethmoids, forward and outward; from the posterior ethmoids and sphenoid, straight forward; from the maxillary sinus forward and upward.

Based on the results obtained by rhinoscopic examination, we may divide the cases of exophthalmos into two clinical groups: (1) those with positive evidence of suppurative sinusitis, and (2) those with negative findings. In the latter group, we may obtain a history that points definitely to nasal sinusitis as the causative factor, but on examination this may show no purulency. A case of this character may be one of closed empyema of the nasal sinus without drainage into the nose or a sinusitis which has cleared itself by previous drainage of pus into the nose, by the discharge of pus through a fistula on the skin surface, by the evacuation of the pus through the formation of a subperiosteal abscess, by direct drainage into the orbital cavity through a fistula, or by rupture of a subperiosteal abscess. In these cases, the nasal mucosa may be normal and the turbinates neither swollen nor congested. In these cases, and also in the cases with presumptive evidence of sinusitis, as shown by swollen and congested turbinates with abnormal mucosa associated with polypi or polypoid degeneration of the middle turbinate, etc., the nasal sinuses should be subjected to an intensive rhinologic study in order to determine whether the nasal sinuses are the causative factor and, if so, to localize the sinus or sinuses involved.

DIFFERENTIAL DIAGNOSIS

Monocular exophthalmos due to any and all causes should be differentiated from that caused by nasal sinus disease.

1. The inflammatory or orbital phlegmon type must be differentiated from that caused by trauma and by infection about the head other than nasal and from that due to metastasis from remote septic conditions.

2. The noninflammatory or neoplastic type will have to be differentiated from the most common cause of the noninflammatory orbital tumefaction, namely, a true orbital neoplasm, benign or malignant, but more frequently the former. In all of these cases, syphilitic gumma and periostitis must be thought of and excluded by the Wassermann test, by an intensive therapeutic test, by the absence of signs of syphilis elsewhere on the body and by negative history. Vascular tumors must be excluded; they are characterized by the presence of abnormal pulsation, bruit and reducibility of the exophthalmos by making pressure on the globe. Other causes of a unilateral exophthalmos, although not so frequent, must be thought of as orbital hemorrhage from trauma and certain blood dyscrasias, such as scurvy, relaxation of the extra-ocular muscles from ophthalmoplegia or extensive tenotomy, tenonitis, cavernous sinus thrombosis and exophthalmic goiter.

PROGNOSIS

1. As to life, orbital phlegmon is invariably fatal when associated with some intracranial complication. Birch-Hirschfeld states that 17 per cent. of all patients with orbital phlegmon died from meningitis, brain abscess or cavernous sinus thrombosis. 2. As to vision, Roemer states that 20 per cent. of orbital phlegmons due to all causes are followed by blindness. Involvement of the optic nerve may be mechanical from pressure on the optic nerve or from absorption of toxins from the infected sinuses or orbit and the loss of visual acuity may be partial or complete.

TREATMENT

The indications for operation: As soon as the diagnosis of an orbital complication of sinus disease has been established, the case becomes one for immediate surgical intervention. Unless prompt surgical measures are taken to evacuate pus in the orbital cavity, there may be considerable danger to life. The pus may burrow along the periorbita to the sheath of the optic nerve and result in an intracranial complication such as meningitis, extradural or brain abscess. An extension of thrombophlebitis of the orbital veins into the cavernous sinus will result in a cavernous sinus thrombosis. Types of operation: There are four methods of surgical procedure, namely, (1) the intranasal operation, (2) the external operation, (3) the combined intranasal

and extranasal operation, and (4) the immediate drainage of the orbital abscess with a subsequent intranasal sinus operation after the acute phlegmon of the orbit has subsided. Of the four methods, the external or the combined external and internal only will be considered. It is only by external exploration of the orbitofronto-ethmoid wall that the pathologic changes can definitely be ascertained and adequate drainage established for both the orbital cavity and the nasal sinuses.

A Killian incision is the best for the orbitofronto-ethmoid operation, as it best exposes the common bony wall of the orbital cavity and the nasal sinuses to inspection and palpation and discloses any dehiscence, bone necrosis, bone absorption, fistula, subperiosteal abscess, mucocele or pyocele, polypi, granulations or diseased mucosa of the sinuses. All diseased tissues must be thoroughly removed, and free drainage established between the orbital cavity and the nasal sinuses by rubber tube draining through the nose. There are two foci of infection, the orbit and the infected nasal sinus, which must be drained, and this is done best along the original route of infection.

It is essential not to make undue pressure in the orbital cavity with the drainage tube and gauze packing, on account of the danger of producing pressure on the optic nerve, which, if excessive and continued, may result in optic atrophy and blindness.

4100 West Madison Street.

Clinical Notes

A UNIVERSAL COUPLING FOR IRRIGATING CANNULAS IN OTOLARYNGOLOGY*

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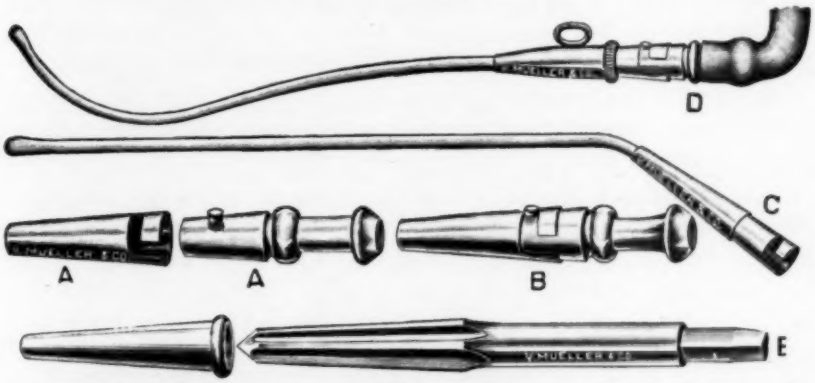
The small piece of apparatus described is offered as an addition to the already extensive armamentarium of the otolaryngologist, with the idea that it may prove of service in the practice of those who wish to speed up and to simplify one phase of office treatment.

The apparatus consists of a universal coupling made, as is shown in the accompanying illustration (Figs. A), in two portions, a male and a female part. The female portion consists of a thin cone of metal which is, of course, hollow throughout. The cone is truncated at its smaller end; this end of the cone is to be soldered or brazed into the handle end of the irrigating cannula to be used, as is shown in the cut at *C* and *D*. Near the larger end of the female part of the coupling is a slot which runs for a short distance in the long axis of the cone, and then for a somewhat greater distance approximately at



Universal coupling. *A*, female and male parts separated; *B*, same in union; *C*, female part soldered to cannula; *D*, cannula with coupling in place, and *E*, reamer.

right angles to the long axis of the cone. This is the slot for the bayonet catch of the coupling. *E* is the reamer that is used to fit various instruments to receive the female member for soldering.

The male portion is made of heavier material, usually brass, and is turned so that one end is a cone which fits snugly into the larger end of the female part. This cone is about 1 cm. long and has, somewhat less than 0.5 cm. from its free end, a small stud, of a diameter just sufficient to fit into the slot cut in the female part. The other end of the male part is turned with a bead so that a rubber tube will slip over it and fasten snugly. The whole portion is bored with as large a drill as the thickness of the metal will permit.

In use, the male portion of the coupling with its rubber tube slips easily into the female part on the cannula, and is firmly held by a slight twist within the cone of the female part, the stud of the male part fitting in the slot of the female, on the familiar principle of the bayonet catch. This is shown in the cut at *B* and *D*.

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* Presented at the Eastern Section of the American Laryngological, Rhinological and Otological Society, Boston, Jan. 24, 1925.

Female portions should be fixed in the handle ends of all the cannulas used in irrigating, such as those for attic douche or Barany tests in the ear and for irrigation of each of the various sinuses, either by the natural orifices or by puncture. If the surgeon is mechanically inclined, he himself can fit the part into his cannulas, first enlarging the opening in the handle end of the cannula by means of a special reamer, and then soldering the cone into the opening thus made. The male end of the coupling is slipped into a piece of rubber tube which will convey irrigating fluid from either a syringe or a pressure bottle built on the principle of the ordinary atomizer.

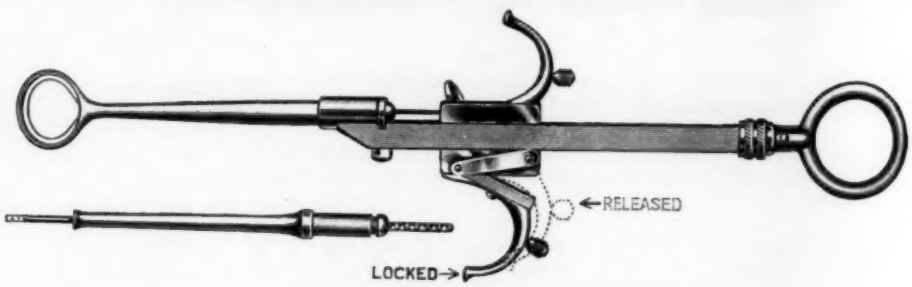
If all of one's cannulas are so equipped, it is an easy and quick matter to use any or several of them in quick rotation, as the connection is made at once, will not leak, will not come apart under any ordinary pressure of fluid and it is at once released when the irrigation is over. Using the pressure bottle, the chances of putting the irrigating fluid anywhere but the place for which it was intended are reduced to a minimum.

Further than this, the end of the male portion of the coupling that goes into the rubber tube when used with a wash bottle, can easily be reamed out to fit closely over the tip of a Luer or other syringe, so that a small amount of solution may be injected through any of the cannulas fitted with the coupling.

THE LAYMAN-STORZ TONSILLECTOME*

DANIEL W. LAYMAN, M.D., Indianapolis

This is a modification of the Beck-Schenck tonsil snare. The automatic action of the clutch and the proper registration of the teeth of the clutch with the spiral groove of the screw rod are mechanical additions which we believe have improved a popular type of tonsillectome. The clutch of this instrument is a new mechanical device which locks automatically, and which maintains a positive engagement with the screw rod, thus insuring the ready movement of



The tonsillectome.

the carriage forward and backward. This automatic device obviates the necessity of the operator or assistant having to manipulate the trigger to lock or unlock the clutch. After the tonsil is engaged through the fenestrum, a rearward pull of the upper and lower triggers drops the clutch and maintains it out of clutching position to permit the free movement of the carriage. The instant the operator releases the pressure on the triggers, a spring attachment drops the lower trigger and pushes up the clutch which engages automatically with the screw rod.

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* Presented at the annual meeting, Middle Section of the American Laryngological, Rhinological and Otological Society, Inc., Feb. 23, 1925, Lafayette, Indiana.

PROGRESS IN OTOLARYNGOLOGY

A Summary of the Bibliographic Material Available in the Field of Otolaryngology

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TONSILLITIS AND TONSILLECTOMY

A REVIEW OF THE LITERATURE OF 1924

ARTHUR W. PROETZ, M.D.

ST. LOUIS

Twenty years ago, a member of the Academy, rising before that body to discuss some phase of the tonsil question, sought indulgence of his audience for dwelling on a subject which "has been threshed out over and over again; so often that it is almost as much as a man's reputation is worth to say anything about it." If this still be true, then the last twelve months have witnessed the passing of many a bright reputation.

Writers today exhibit none of this reticence, but, on the contrary, are turning out articles on all phases of the tonsil question at the rate of four or five a week. Naturally, the great majority of these communications do not contribute anything to the sum of knowledge. On scanning the literature of ten to twenty years ago, one encounters much the same discussions that are afoot today. With a few signal exceptions, current literature bears witness to the fact that most of the fundamental questions propounded when tonsils and adenoids first came into prominence are still unsettled, namely: What are they for? Shall we take them out? If so, when, and how?

Opinions still differ within wide limits concerning the physiology of the tonsil; whether it has a function in man, and, if so, whether that function persists in adult life. There is no longer a doubt in the minds of responsible observers that diseased tonsils should be removed. The question of removing all or part of the tonsil, which troubled laryngologists a decade ago, has also been decided in favor of complete extirpation. This matter is summed up by Fetterolf:[1]

> The great desideratum of any tonsillar operation is to get rid of all the lymphoid tissue. At the present time, in order to completely remove this tissue, we have to take all the capsule out. To my mind the ideal procedure would be to take away all the lymphoid tissue of the tonsil but leave the capsule in place. Whether such a complete lymphectomy (if I may use that term) of the tonsil can ever be carried out without taking out the capsule we do not know. That at least is the ideal which we believe should be striven for.

The point in sparing the capsule, if this should be made possible, without of course leaving any lymphoid tissue, is that the capsule affords

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1. Fetterolf: Tr. Am. Laryngol. Assn., 1923, p. 281.

something of a barrier to infection of the peritonsillar tissues from which the blood stream may, in turn, be infected, with the usual complications.

Current literature is full of attempts to answer the question *"When* shall we remove the tonsil?" but above all rises the persistent and increasing clamor of those telling us *how* it shall be done. New tonsil "methods" and instruments still file by in endless procession.

Numerically, it is of interest to observe that, roughly, one half of all the papers published within the year deal chiefly or exclusively with treatment, operative and nonoperative, of which latter the roentgen ray, radium and coagulation are receiving increasing attention. One third of the articles are devoted to pathology and bacteriology (including case reports) and the remaining one sixth are almost evenly divided between embryology, histology, anatomy, diagnosis, prognosis and complications —the last predominating.

EMBRYOLOGY AND HISTOLOGY

There has long been a controversy as to the origin of cartilage and bone in the tonsil. Interest in this question has increased of late, and reports of long series of tonsils routinely examined for these tissues are coming to light. Two principal theories are entertained: The first holds that the tissues in question are the result of metaplasia. This belief is based on the frequent encountering of postinflammatory fibrous tissue in the same tonsil, the assumption being that metaplasia has occurred, due to inflammatory reaction. The other theory holds that a congenital aberration has deposited in the tonsil tissues which do not belong there. The eustachian tube, derived from the first branchial cleft, and the styloid process, derived from the second branchial arch, are both contiguous to the tonsil. Islands of cartilage are found in the neighborhood of these structures, and it is not beyond the realm of plausibility that such islands may wander off and grow in the tonsillar capsule and surrounding areolar tissue. This view is strengthened by the appearance of cartilage in the tonsil of the new-born, where no inflammatory changes can have taken place.

Hillkowitz [2] examined 750 tonsils routinely, of which 14.7 per cent. included cartilage. Lubarsch, in 1902, reported 15.7 per cent. Weller [3] reported as high as 20.9 per cent.

Cartilage arises in the capsule and in the fibrous trabeculae of the tonsil, but never in the lymphoid tissue. Its incidence is greater in those tonsils which show increased connective tissue deposits, and the masses are multiple as a rule.

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2. Hillkowitz, P.: Ann. Otol., Rhinol. & Laryngol. **33**:473 (June) 1924.
3. Weller, C. V.: Ann. Otol., Rhinol. & Laryngol. **32**:687 (Sept.) 1923.

In rare instances, true bone deposits with lamellae and haversian canals are encountered, and it is of interest to note that in these instances cartilage deposits are also present elsewhere in the tonsil. No determining factor is suggested which might produce cartilage in some tonsils and not in others in which the inflammatory stimuli were the same.

Moore's researches lead him to sum up the case [4] as follows:

1. Cartilage occurs in the connective tissue of the tonsil in one-third or more of the cases examined. This has been verified by careful microscopic examination. 2. It originates in the majority of cases from the embryonic "rests" of the branchial arches. This agrees with the fact that the cartilage appears in a region where the embryonic cartilage is very abundant, and the view which holds the process of growth to be a transition of connective tissue to cartilage is, in most cases, erroneous. There is some reason, however, to suppose that a chrondroplastic and osteoplastic predisposition on the part of certain connective tissue cells (arising from branchial tissue) to respond to inflammation may account for the condition in some cases. 3. The osseous tissue in the tonsil is formed from the cartilage by a process of physiologic ossification, and is found in conjunction with, and in close vicinity to, the cartilaginous tissue. 4. The predominance of cartilage over bone in the fetus and infant, and of bone over cartilage in advanced age, has been confirmed by the research work of five or more observers. 5. The embryonic cartilage is rarely the starting point of neoplasms. 6. Chondromas and fibrochondromas of the tonsils originate in these cartilaginous islands in the tonsils.

ANATOMY

Several morphologic variations are recorded, the most noteworthy among them being a case of supernumerary tonsil occurring in a child, reported by Piazza.[5] In this case, the mass consisted of lymphatic elements enmeshed in connective tissue. The propriety of regarding isolated masses of lymphoid tissue as supernumerary tonsils is open to question.

Another case of accessory tonsil is reported by Kelemen.[6] In this patient the mass was attached to the superior pole of the tonsil by a pedicle; it consisted of lymphoid tissue with lacunae resembling those of the normal tonsil, and was covered with several layers of epithelium. It contained cysts which the author regarded as inflammatory. He believed the tumor to be of embryonic origin, although it was first noticed by the patient when she was aged 35. It developed slowly for ten years, then more rapidly for six months before removal.

Still another anomaly recorded [7] is one of the styloid process occurring in a man, aged 70, discovered only after tonsillectomy performed for the relief of an arthritic condition. After the tonsil was removed, the bony process was seen extending diagonally across the fossa. No free end could be felt above or below, but roentgen-ray examination showed

4. Moore, I.: J. Laryngol. & Otol. **39**:195 (April) 1924.
5. Piazza: Rev. de laryngol. **45**:105 (Feb.) 1924.
6. Kelemen: Folia Otolaryngol. **12**:431 (Sept.) 1924.
7. Thompson, Leroy: Illinois M. J. **46**:129 (Aug.) 1924.

it to be a long styloid process. The process on the opposite side was also very long, but did not protrude into the fossa. Normal healing ensued.

PHYSIOLOGY

Little has appeared in the last twelve months in regard to the physiology of the tonsils, beyond a few scattered studies of the gland as an internal secretor.

In order to study the possible rôle of tonsils and adenoids in this respect, basal metabolism was determined, according to the method of Hermann and Richard. The results were not enlightening, as only eight patients were studied, all between the ages of 17 and 22, and two of these may have been cases of hypothyroidism. Of the remaining six, four exhibited the normal metabolic rate.

Stapler [8] reports the astonishing observation of fourteen cases of pregnancy occurring after the removal of tonsils in previously sterile young married women. In these patients (most of them seeking medical aid on account of the sterility), usually some menstrual irregularities occurred which may have been directly responsible for the condition.

All, however, had diseased tonsils which were removed. Stapler believes these could not be considered as coincidences. He concludes that the fecundity was restored through some reaction of an endocrine nature on the hypophysis and the thyroid, and allows himself to speculate on the possible effect of the tonsils on sterility in the male.

PATHOLOGY AND BACTERIOLOGY

Davis,[9] in a paper entitled The Pathology of the Tonsil, presents a comprehensive outline of present-day thought on the simple inflammations of the tonsil. The material is gathered from many sources, and is studied from the standpoints of function, morbidity and mortality. The author makes a plea for the careful study of pathologic changes preceding any attempt at surgery, and decries the frequently "unscientific consideration given this important but dangerously common" operation. He states that the gross and histopathologic examinations of large groups of tonsils show conclusively that if the same criteria of inflammatory and degenerative changes which render tissue elsewhere nonresistant are to be applied here, then it is safe to state that nonpathologic tonsils are removed more frequently than any other tissue of the body. The tremendous number of tonsillectomies performed after scant preliminary consideration of indications and pathologic changes contrasts unfavorably with our meager scientific data on the tonsil's function and the results of its removal. It is a forceful indictment of the promiscuous operator.

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8. Stapler, A. L.: Illinois M. J. **45**:290 (April) 1924.
9. Davis, J. E.: Ann. Otol., Rhinol. & Laryngol. **33**:657 (Sept.) 1924.

Davis feels that there is sufficient evidence to regard the tonsil as definitely and actively concerned in the "developmental, protective and mechanical chain of essentials of life," and that its removal during its functioning period is quite frequently followed by compensatory replacement of lymphoid tissues in less effective and advantageous positions. He summarizes: The available defenses of the tonsils are an intact stratified epithelium, actively hypertrophying and hyperplastic follicles, and oxidizing and reducing cellular activities; and concludes with the dictum that the removal of adenoids before the age of 4 years and of the palatine tonsil before puberty, produces a liability to pathology in "development processes and local nutrition efficiency."

Other observations along the same lines have been made. It has been noted that enlarged tonsils are more frequent at some ages than at others, and that often the possessors of such tonsils are in the best of health. Immensely hypertrophied tonsils are frequent in especially robust children. Cronk [10] charted the incidence of tonsillar hypertrophy against the growth rate of children at various ages, and found two maximums of weight increase. He found these peaks in his curve uniformly followed similar peaks in incidence of tonsil hypertrophy by from two to three years. This is true for both sexes, although the growth curves were not identical. A small hypertrophy incidence (at 10 years in boys and 12 years in girls) was followed by similarly reduced weight increase. The conclusion is that increase in lymphoid tissue is a necessary preliminary to increase in weight, and that the tonsils hypertrophy in order to take their share in the production of lymphocytes rather than as a result infection.

A searching and comprehensive study of histopathologic changes in the tonsil and their relation to associated clinical findings was made by Bell.[11]

In comparison to the number of observations on the pathology of tonsils on the one hand and the clinical findings on the other, there is a striking paucity of attempts to correlate the two. The paper in question approaches the subject from the standpoint of hemolytic streptococcus invasion. One hundred pairs of tonsils, which were regarded as diseased by the clinician, were studied. Cultures were made from throats before tonsillectomy, from removed tonsils, and again from the throats after tonsillectomy. The histopathology also was studied, and comparison made between these observations and the clinical histories of the patients.

Hemolytic streptococcus was encountered (in 100 cases) as follows:

Throat swab and both tonsils, thirty-five times; throat swab and one tonsil, four times; throat swab and neither tonsil, three times; absent

10. Cronk: Lancet **2**:904 (Nov. 1) 1924.
11. Bell, H. H.: Ann. Otol., Rhinol. & Laryngol. **33**:305 (June) 1924.

in throat, present in both tonsils, fifteen times; absent in throat, present in one tonsil, thirteen times; absent in throat and both tonsils, thirty times.

Throat cultures were made after tonsillectomy from twenty patients who had been carriers previous to operation. These were all from the group which exhibited streptococci in throat and both tonsils. Ten recultures were made from one to eight months after tonsillectomy, and with one exception all were negative. This showed cultural characteristics ascribed to the bovine type.

Significant from a clinical standpoint is the fact that, although 70 per cent. of the patients originally cultured in the winter months were carriers, and that the percentage dwindled to 56 per cent. in summer, practically all were free from *Streptococcus hemolyticus* infection after operation, as has been noted. It throws some light on the question: When shall we operate?

A record of histopathologic observations follows, with photomicrographs, which is too lengthy and full of detail to be reviewed here.

In a subsequent supplementary paper the same author emphasizes his observations of certain other histopathologic features: necrosis in the follicles and ensuing regeneration; fibrosis; the histologic picture of acute lacunar tonsillitis (with an unusual photograph); striated muscle in tonsils; and a note on the infantile tonsil.

In conjunction with these observations on the incidence of the streptococcus should be mentioned an investigation conducted by Bloomfield and Felty[12] on its transmission. They found that close association with carriers or sick persons was required to disseminate the organism. The problems of droplet, contact and fomite contaminations were considered. It was found, to begin with, that only certain areas of the mouth could be considered as culture mediums for these germs, prominent among them, the tonsils. Speech and coughing, however, failed to eject bacteria planted in these areas or growing there. It was necessary to swab the lips and anterior portions of the mouth with them in order to disseminate them in this manner. Swabs on the pharynx, palate and tongue were not ejected. The authors maintain, therefore, that experiments founded on the rinsing of the whole mouth with *Bacillus prodigiosus* do not simulate the actual conditions and are valueless so far as tonsil disease is concerned. In fact it was impossible for them to demonstrate in any manner that tonsillitis and scarlet fever are spread by droplet infection. Tonsil bacteria, however, may be brought to the front of the mouth and ejected by expectoration. Objects placed in the mouth also become infected with them, and actual contact with these is necessary for reinfection to take place.

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12. Bloomfield, A. L., and Felty, A. R.: Bull. Johns Hopkins Hosp. **35**:115 (April) 1924.

A record [13] was made of the types of bacteria cultivable from material taken from the crypts of 147 pairs of tonsils bisected with a sterile knife.

Results are summarized as follows:

Streptococcus hemolyticus, 133 patients; staphylococcus, ninety-two patients; *Streptococcus viridans,* forty-six patients; *Micrococcus catarrhalis,* twenty-nine patients; *B. influenzae,* twenty-five patients; pneumococcus, thirteen patients; *B. mucosus,* eight patients; *B. diphtheriae,* six patients.

Pure cultures were obtained in eight instances; seven of them *Streptococcus hemolyticus* and one *Streptococcus viridans.* The figures given here for *Streptococcus hemolyticus* are roughly 25 per cent. higher than those of Bell, cited in the foregoing. Great disparity of figures for these organisms creeps in, probably owing to the differences in their classification by various observers.

An attempt is made by Heiberg [14] to analyze and classify hyperplasia of the tonsil on the basis of variations in the germ centers. He suggests also that systemic reactions in tonsillar hyperplasia may be due to a necrobiosis occurring in these centers, and that the degree of systemic intoxication may depend on the extent and distribution of the destruction.

The tonsil is still receiving its plentiful measure of condemnation as a focus of infection and a portal of entry in blood stream infection, with some apparent contradictions on the part of the pathologists. When we consider, however, that the type of tonsil which reaches the individual pathologist depends entirely on the diagnostic skill, or perhaps the surgical tendencies of the clinicians who supply them, it becomes obvious that the percentages of hypertrophies, hyperplasias and fibroses must vary. One would expect the pathologist, examining the routine tissues from the surgeon who believes that "the only good tonsil is one in a bottle," to think lightly of the tonsil as a troublemaker.

Crowe [15] points to the tonsil as being a likely source of blood-stream infection. He describes the cryptal epithelium and the small ulcers which occur deep in the crypts, some of which do not heal but remain chronic. Such ulcers were brought into prominence some years ago by MacLachlan, and are frequently observed in chronic tonsillitis. Crowe emphasizes the fact that these ulcers are surrounded by a close network of thrombosed capillaries surrounded by a zone of plasma cells, lymphocytes and leukocytes.

The liberation of infected embroli from such an area into the blood stream and the passage of organisms into the lymph channels is prob-

13. Julianelle, L. A.: J. Lab. & Clin. Med. **9**:699 (July) 1924.
14. Heiberg: Acta otolaryngol. **6**:190, 1924.
15. Crowe, S. J.: Direct Blood-Stream Infection Through Tonsils, Arch. Int. Med. **33**:473 (April) 1924.

able. This condition was encountered most frequently in tonsils removed from subjects suffering from infectious arthritides. The failure to find any cervical adenitis in some of these patients suggests a direct blood-stream infection. It appears also that arthritic patients, whose tonsils revealed the ulcers in question, reacted most favorably after their removal.

The nature of the influence of focal infection on the human organism is the subject of a paper presented by Pemberton [16] before the American Laryngological Association.

Four hundred cases of chronic arthritis were observed in army hospitals during the war; a larger number of patients than had ever been studied before, under controlled conditions. The first and outstanding observation was that the removal of focal infections from upper respiratory, genito-urinary, dental and other tracts, was not always followed by a cure. The second was that a great many (46 per cent.) of these arthritic patients recovered in the presence of some demonstrable focus of infection.

Nearly 60 per cent. of the cases followed an immediately preceding exposure, next in frequency followed dysentery and other causes, and recent acute tonsillitis was far down the list, only 3 per cent. Twenty-seven per cent. had contracted arthritis in the absence of any demonstrable focus. Tonsillar foci of infection, however, were demonstrable in 52 per cent., dental in 33 per cent. and genito-urinary in 12 per cent. Twenty per cent. showed a combination of these.

The important thing is that, although ninety-two, or 23 per cent. of the patients, recovered in the absence of any known focal infection, just twice as many, or 46 per cent., got well in the presence of such a focus.

Numerous laboratory procedures were routinely carried out in these cases. Blood urea was found to be normal, blood creatin increased in one-half of the cases. In 20 per cent. the basal metabolism was slightly reduced. Glucose tolerance curves proved most interesting. The tests were performed by giving 100 gm. of glucose by mouth and examining the sugar in the blood. In normal persons the sugar content rises to a certain level in half an hour, and again falls to normal an hour later. The group of arthritic patients, however, produce a different curve. With the same baseline, curves for arthritic patients go much higher; in other words, the glucose in the blood is not utilized or removed with the normal celerity.

A boy with arthritis who showed this curve had his tonsils removed and two weeks later he was free from arthritis and the sugar tolerance was at a normal level. Other patients showed similar results. Another

16. Pemberton: Tr. Am. Laryngol. A. **33**:242, 1923.

patient, in whom no focus of infection was found, made the same recovery, with the same sugar curve after repeated injections of nonspecific protein.

Venous blood oxygen was also found to be high, its removal at the periphery apparently being impaired in some way.

Certain patients recovered when unnecessarily heavy diets were decreased and the extra metabolic burden removed.

It was found also that sometimes processes started by the teeth or the tonsils were perpetuated by the intestinal tract, and then the condition responded only to diet.

Holsti [17] supplies parallel data in these cases of arthritis, in an attempt to link the picture of pathologic tonsil changes with the clinical signs. Two hundred and three tonsils from 123 persons were examined, some at necropsy, others at operation, to determine if possible any variations between those of persons in good health, of arthritic patients and of persons otherwise diseased. Ten tuberculous tonsils were found, five of which were taken to be primary, the other five associated with pulmonary lesions. The thirteen pairs of tonsils taken from healthy persons at necropsy, all showed some slight chronic inflammatory changes.

In the arthritic group Holsti also reports the presence of ulcers, blood vessel changes and sometimes necrosis. In the third class (107 tonsils removed from patients suffering from a variety of ills, including pneumonia and heart disease), the slight changes did not differ essentially from those removed from healthy persons in the series.

In the arthritic series, a sore throat had recently preceded the attack in 71 per cent. of acute cases, 47 per cent. of relapsing cases of acute arthritis and 22 per cent. of chronic cases—a wide variation from Pemberton's 3 per cent. In most patients the tonsillar inflammation had largely subsided when the arthritis reached a standstill; in some the tonsillitis healed while the arthritis persisted. Only a few patients show a truly parallel course between tonsil recovery and joint recovery.

The local lesions in such patients have been studied by Wood and Case.[18] They consider the crypt epithelium a poor barrier to bacterial invasion and point to the tonsil parenchyma as the most readily influenced of all subdermal structures. And still, few chronic pathologic entities can be recognized in the parenchyma. In the crypts, toxic substances are common. Bacteria there may cause damage through their toxins or by their entrance into the tonsil tissue. These writers believe that the breaks noticed in the cryptal epithelium are probably artifacts; an opinion with which many observers are at variance.

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17. Holsti, O.: Finska Läk.-Sällsk. Handl. **66**:365 (May-June) 1924.
18. Wood, G. B., and Case, A. E.: Ann. Otol., Rhinol. & Laryngol. **33**:958 (Sept.) 1924.

The pathways followed by tonsil infections in becoming systemic are discussed by Howarth and Gloyne.[19] They describe the course of the infection through the stratified epithelium, generally of the crypts, into the diffuse lymphoid tissue beneath, and thence along the trabeculae to the capsule, where they pass into the larger lymph vessels of the pharyngeal wall which in turn drain into the deep cervical glands.

They find tuberculous infection not very common—about 5 per cent.—which corresponds precisely with Wood's figures and also those of Holsti cited in the foregoing. In the majority of patients, cervical adenitis is the result of absorption of septic material from infected tonsils, the pyogenic streptococci being the chief offenders. They reason that the logical procedure then is to remove the tonsils and not the glands, stating that in many patients the glands recover after tonsillectomy. The figures supplied by Kaiser a few years ago in his review of 5,000 tonsillectomies, showed a discouragingly small response of the cervical adenitis to tonsillectomy.

In this connection a theory expressed by Wotzilka [20] is of interest. He believes that the mouth breathing occasioned by hypertrophied tonsils, especially the pharyngeal, renders respiration shallow and superficial which has an unfavorable effect on the blood and lymph circulation of the lungs, and that under these conditions infectious organisms become more readily fixed in the intrathoracic lymphatic system.

Several contributions on Vincent's angina appear. The histopathology of the disease was studied and described by Seguin, Bouchet and Logeais.[21] The tonsil substance is penetrated to a considerable depth by the spirillum and the fusiform bacillus, which are present in enormous numbers in the immediate vicinity of the ulcer, and decrease as they become more remote from it. Near the ulcer they form a kind of network; deeper down they send out advancing columns of organisms which follow the trabeculae in the main. The more superficial masses are composed almost entirely of the bacilli, deeper strata are mixed, and the penetrating fingers are spirilla exclusively. The spirilla closely surround the capillaries but do not penetrate them.

The lymphoid tissue is densely infiltrated with polymorphonuclear leukocytes. The epithelium is likewise penetrated at first by the spirilla and later destroyed by the fusiform organisms. The severity of the infection and the extent of the destruction appear to depend wholly on the virulence of the spirilla. Actual contact of the organism is

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19. Howarth, W. G., and Gloyne, S. R.: J. Laryngol. & Otol. **39**:429 (Aug.) 1924.

20. Wotzilka: Monatshr. f. Ohrenh. **58**:293 (April) 1924.

21. Seguin, Bouchet and Logeais: Ann. d. mal. de l'oreille, du larynx et du pharynx **3**:435 (May) 1924.

necessary to produce necrosis. Puig [22] discusses the teeth, third molars in particular, as etiologic factors to be dealt with in this disease.

The incidence and pathogenesis of tonsillar concretions are the subject of a contribution by Weller.[23] He finds small calculi in 8 per cent. of all tonsils examined. The average age of the subjects studied, of which there were eighty, was 16.8 years. The fact that large tonsilloliths are usually clinically troublesome in advanced adult life, points to a slow rate of growth. These calcareous deposits occur in all portions of the tonsil, but show a predilection for the crypts, where colonies of mouth organisms become impregnated with calcium salts. Food rests, débris, inflammatory exudates, desquamated epithelial cells and blood clots were found to supply the necessary nucleus. Within the follicles, blood, exudates, pus or necrotic material may become calcified as they may elsewhere in the tissues.

Alfredo Bo [24] reports a case of tumor of the tonsil involving a number of cranial nerves. This occurred in a woman, aged 60. who noticed a year before examination that her throat was swollen on the right side. Gradually this interfered with deglutition and phonation, and later with respiration. Some pain was noted throughout. The swelling spread to the left side, and ptosis of the right eyelid occurred. Weakness and loss of weight were outstanding symptoms.

Physical examination showed atrophy of the muscles of mastication on the right side, and pain occurred in the temporomaxillary joint on attempting to open the mouth. In the right tonsillar fossa was a mass of tumor tissue the size of a walnut, irregular in outline and extensively ulcerated. The palate was not involved. The tumor mass was firm but compressible and not painful on pressure. Cervical adenopathy was present on both sides. The process was accompanied by certain paralyses. Movements of the right eye were abolished; ptosis occurred, and pupillary reflexes were slow. There was also some anesthesia of the forehead on the affected side.

Microscopic examination revealed little lymphoid tissue present. There was extensive proliferation of the epithelium, which constituted the great part of the mass.

The author explains the syndrome as an invasion of the cranial cavity along the lymph channels, in such a way as to involve the third, fourth, fifth and sixth nerves where they traverse the cavernous sinus and the sphenoidal fissure.

Epithelioma of the tonsil is reviewed by Smith.[25] Of forty patients studied by this author, thirty-six were men, 75 per cent. of them heavy

22. Puig, J.: Presse méd. **32**:390 (May 3) 1924.
23. Weller, C. V.: Ann. Otol., Rhinol. & Laryngol. **33**:79 (March) 1924.
24. Bo, A.: Boll. d. mal. d. orrecchio, d. gola e d. naso **42**:28 (March) 1924.
25. Smith, Leon H.: New York State J. Med. **24**:289 (March) 1924.

smokers. Fifty per cent. suffered from dental caries, and two were syphilitic. He emphasizes the necessity of great care in excising tissues for biopsy, as the likelihood of secondary infection and oral sepsis is very great. Treatment of these patients, which was by means of radiotherapy, will be discussed under its proper heading.

A curious and interesting occurrence of what the authors take to be an anaphylactic reaction to milk in contact with a fresh tonsillectomy wound is reported by Josephson and Lustberg.[26]. A woman, aged 40, with a history of frequent sore throat, gastro-intestinal upsets and some other immaterial complaints, was given some ice cream, eight hours after tonsillectomy, performed under local anesthesia (apothesin and epinephrin). Seven hours later a tremendous swelling of the cervical glands on both sides of the neck followed, which was painful and developed rapidly. The regions of the wounds were edematous, but otherwise normal. The glands on the right side subsided the same day; those on the left continued to swell, and the edema of the throat extended upward to the palate and downward to the larynx. Deglution and respiration became difficult, and the temperature, which had been approximately normal, rose to 100 F. The swelling of the neck increased until midnight of the day following the operation when it subsided as quickly as it came, and had practically disappeared by the following afternoon. The wounds healed rapidly and the patient made a good recovery.

At no time during this reaction was there any sign of local infection or sepsis, the only extraneous manifestation being a constant and painful contraction of the uterus. The patient was excitable throughout and was little affected by large doses of morphin and paraldehyd. Blood and urine were negative.

As no food but ice cream had been ingested, intradermic sensitivity tests to milk and eggs were made. The patient gave a prompt and definite reaction to milk proteins.

Lately, there has been an increased interest in the pharyngeal tonsil, which finds its recent expression in three papers: "Adenoid Vegetations and the Exudative-Lymphatic Diathesis," by Viggo Schmidt,[27] "Blood Pressure and Arterial Pulse in Adenoid Subjects," by Donadei,[28] and "Resistance of Erythrocytes in Adenoid Patients" by Maggiorotti.[29]

The so-called exudative lymphatic diathesis is a condition of childhood. Cases reported as occurring at puberty are believed to be merely

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26. Josephson, E. M., and Lustberg, S.: Ann. Otol., Rhinol. & Laryngol. **33**:495 (June) 1924.
27. Schmidt, V.: Acta Otolaryngol. **6**:345, 1924.
28. Donadei: Arch. ital. di otol. **35**:338 (Oct.) 1924.
29. Maggiorotti: Arch. ital. di otol. **35**:32 (Feb.) 1924.

recrudescences of some former undiagnosed attack. Schmidt believes from his own observations that the average age incidence of rapid adenoid increase is from 6 to 7 years, and that usually the onset antedates the visit to the specialist by less than a year. One would say that the patients encountered in our American clinics were hardly so prompt. He believes also that, as the lymphatic diathesis occurs in earlier years, it is seen by the pediatrician, and it is therefore difficult for the rhinologist to associate it as an etiologic factor with the adenoids for which he is consulted.

Of 193 patients with adenoids, Schmidt saw only five with the syndrome. But 120 of these patients had ear involvements of an inflammatory nature which he regards as evidence of an early attack. His assumption that the younger children go to pediatric clinics and are therefore not observed by rhinologists seems hardly justifiable at this day.

Donadei's experiments with the sphygmomanometer on adenoid subjects seem to indicate that the removal of the adenoids has a tendency to return the blood pressure to, or near, normal in those patients who show hypertension or hypotension (about 60 per cent.). He hypothesizes a complicated theory of endocrine reactions to explain this phenomenon, but falls back on the relief of respiratory embarrassment as the probable chief factor.

Magiorotti states that an increased resistance of erythrocytes to hypotonic solutions occurs in conjestive icterus, cancer, nephritis and adenoids, and that a decrease occurs in certain other maladies. This increase is brought about by a toxic substance in the blood, which strengthens the union between the hemoglobin and the red cell stroma. In adenoid subjects, this increased resistance immediately returns to normal on removal of the vegetations. The increase in fixation is constant and does not vary with the size of the growth. The author considers an increase in red blood cell resistance in the presence of adenoids, even though these be nonobstructive, as an indication for adenoidectomy.

COMPLICATIONS

Complications may be considered under three heads: (1) local, (2) systemic, and (3) postoperative accidents. The first classification includes disturbances of tonsil origin in the contiguous structures.

Spalaikovitch [30] reports a case of a fistula which extended from a peritonsillar abscess cavity to an opening between the tonsil and the last molar. It discharged for one and one-half years and was cured by a single injection of an iodized oil, employed to render the tract opaque for roentgen-ray examination!

30. Spalaikovitch: Rev. de laryngol. **45**:589 (Sept.) 1924.

Edel [31] reports a case of peritonsillar abscess which pointed on the floor and anterior wall of the external auditory meatus. The infection was a mixed one, at one time containing diphtheria bacilli. Attention is called, in this connection, to the free communication of the tonsil bed with the parotid region; to the occasional pointing of a parotid abscess in the external auditory meatus; and to the importance of watching the retromandibular space, during peritonsillar disease for swellings which indicate that the process is spreading to this area.

From various quarters come warnings to regard tonsils and adenoids, more especially the latter, with suspicion in ear complaints. The importance of early inspection and, if necessary, removal in cases of beginning deafness cannot be overemphasized.

Of the remote effects of tonsil disease, articular and muscular rheumatism are the most frequent. Experimental evidence of tonsillogenic infection in these cases is advanced by Reidar Gording.[32] He studied 260 patients among the summer visitors at a Norwegian health resort. In 28 per cent. of these suffering from primary chronic polyarthritis, a definite tonsillitic etiology could be made out from the history and the local findings. In comparing this with Holsti's 22 per cent. and Pemberton's 3 per cent., it should be taken into account that the patients in the first series were all wealthy persons at summer resorts, to whom extreme exposure was practically unknown. The last, on the contrary, were all men on active army service, many of them unaccustomed to exposure but now subjected to it, which drives up the statistics for exposure and leaves the tonsillitic cases far behind. This demonstrates the fallacy of drawing conclusions from series of selected cases. Gording continues with a long list of figures on the relation of the tonsil to various types of rheumatism. Tonsillectomy was performed on fifty of these patients, followed by signs of improvement in 65 per cent., which were classified as follows:

Ten in sixteen cases of primary chronic polyarthritis; one in three cases of secondary chronic polyarthritis; six in nine cases of chronic rheumatism, and five in six cases of acute rheumatism. *Streptococcus hemolyticus* was found in the tonsils of all these patients, but the same organism was also found in six of twenty patients without tonsillitis, so that its presence alone without symptoms is of no significance.

From the pen of Mygind [33] comes a contribution on the entire chain of septic phenomena: polyarthritis, chorea, endocarditis and erythema nodosum, which he combines under the term rheumatic fever, and on a few patients with nephritis studied together with them. Based on a long list of statistics—too long to repeat here—he draws the following

31. Edel: Ztschr. f. Hals, Nasen-u. Ohrenh. **8**:494 (July 15) 1924.
32. Gording, R.: Acta. Otolaryngol. **6**:306, 1924.
33. Mygind: Acta. Otolaryngol. **6**:335, 1924.

conclusions: that chronic tonsillitis, and not the acute disease, is the underlying cause of the arthritic disturbances; that the fatigue so often preceding the arthritis in his patients is a symptom of tonsil infection, and that chronic tonsillitis and chronic arthritis show similar onset curves when plotted against the ages of the patients.

He agrees with Chvostek that the systemic manifestations are essentially the result of anaphylactic reactions or intoxications and are not primarily a septic infection, although if a bacteremia occurs the organisms are found in the rheumatic parts.

The removal of such tonsils in a group of eighty-eight children studied by Ingerman and Wilson [34] was followed by about the same percentages of recovery and recurrence as in a similar control group of children who did not undergo tonsillectomy. Recoveries in the group operated on exceeded those in the other by only 4 per cent. Four out of five, of each group, recurred in from one to eleven years.

Cases of kidney involvement accompanying tonsillitis are reported. They range from a simple albuminuria, frequently observed, to a case of convulsions with a blood pressure of 215 mm., which subsided and have not recurred two years after tonsillectomy.

The large bulk of postoperative complications falls under the head of severe primary and secondary hemorrhages. Of unusual interest is an account by Callison [35] of attempts to stop severe hemorrhages following tonsillectomy, in a possible hemophiliac, which were only successful on the eleventh day following operation.

The patient announced when he reached the operating table that he was a bleeder, and a Biffi-Brooks coagulation test was immediately done. Coagulation occurred at six and eight minutes. This finding, while possibly within permissible limits, should have strongly indicated that the patient spoke the truth, as the average clotting time reported for this method in routine preoperative tests is from four and one-half to five minutes. The reports of postoperative hemorrhage in bleeders or facultative bleeders should warn the surgeon that any indications of these conditions should receive the gravest consideration. It should be followed by preliminary treatment, if such is indicated, and by the utmost caution in operating. Some operators in doubtful cases cannot be induced to remove more than one tonsil at a time.

Rosenbaum [36] reports a case of emphysema of eyelids, face and neck following tonsillectomy, which subsided without further incident on the third day.

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34. Ingerman, Eugenia, and Wilson, May G.: Rheumatism: Its Manifestations in Childhood Today. Tonsillectomy in Its Relation to the Recurrence of Rheumatism, J. A. M. A. **82**:759 (March 8) 1924.

35. Callison, J. G.: Laryngoscope **34**:354 (May) 1924.

36. Rosenbaum, Charles: Subcutaneous Emphysema Following Tonsillectomy, J. A. M. A. **82**:2119 (June 28) 1924.

A tonsil operation was followed by a generalized angioneurotic edema in a patient who had been subject to these attacks for six years. A similar attack followed a sinus operation.[37] Unlike the patient of Josephson and Lustberg, cited in the foregoing, who showed a sensitivity to milk, this man did not react to any of the foods which he had ingested before the operation.

PROGNOSIS

It is rare that so large a series of patients receive such careful scrutiny as those reported by Kaiser.[38] In July, 1922, this author published the results of his observations on: "The Effect of Tonsillectomy on the General Health of Five Thousand Children." Now he reviews the results on 1,200 patients, compared with those in a similar number of unoperated children. He observed these children from the standpoints of local symptoms, of systemic infections and complications, and of the general state of nutrition.

He finds that tonsillectomy offers considerable improvement and relief from local disturbances, sore throats, coryzas and ear infections. While there was some improvement in the cervical gland involvements, still the results in this field were not encouraging; it was especially true that cervical adenitis did not commonly subside after tonsillectomy.

Tonsillectomy had no effect on the incidence of laryngitis, tracheitis, bronchitis and lung conditions. These occurred with about the same frequency in both groups. Heart disease was oftener encountered in the unoperated group. Arthritis and chorea were about equal in both groups. Malnutrition was much commoner in the unoperated group.

Whitton's [39] findings in a much smaller series follow those of Kaiser, in the main, and add also that there is some evidence that tonsillectomy may be of some worth in exophthalmic goiter, but not in the simple form.

TREATMENT

It is under this head that one encounters the most bewildering array of "methods," procedures and instruments. There is an all too common tendency for operators to perfect themselves in one operation or another, to modify it to suit their own needs and dexterities, and then to publish an account of the procedure as "The ideal operation." The very fact that, after three decades or so of study, a single year produces as many as eighteen "new" methods and instruments, is fair evidence that a universal ideal has not been attained. One man's perfect method may

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37. Robichaux: Ann. Clin. Med. **3**:308 (Oct.) 1924.
38. Kaiser, Albert D.: Effect of Tonsillectomy on the General Health of Twelve Hundred Children, J. A. M. A. **83**:33 (July 5) 1924.
39. Whitton, N.: Practitioner **113**:105 (Aug.) 1924.

prove a dismal failure in the hands of another. Furthermore, many flat and unqualified statements appear on the choice of anesthetics, the use of suction, the position of the patient and other important details, without regard to the type of operation employed. The folly of a short gas anesthesia in a dissection operation, for instance, is apparent. The inadvisability of using a deep ether anesthesia in a quickly performed guillotine operation is less apparent, but equally deserving of consideration. The zeal of these writers is equalled only by that of some men who use the roentgen ray and who want to abolish the operation altogether.

The word "new" is incidentally much abused, for one finds the prototypes of most of these instruments scattered through the literature of a generation. A criticism of this or that method frequently met with, is that it is a safe procedure "only in the hands of a skilled operator." There is a tacit implication here that tonsils may be removed by anybody (regardless of special fitness) who happens to possess the instruments. This comes unfortunately near being the actuality, as it is. Therefore let us lay more emphasis on the skill of the operator and not condemn any method merely because it requires dexterity and proficiency.

One cannot be blind, however, to some additions and modifications which have undoubtedly rendered the removal of tonsils easier and safer in average hands. The snare and the guillotine form the basis for most of these improvements. Mulford [40] believes the guillotine and the scissors are archaic and recommends the knife and the snare, the former designed by himself. He also recommends the use of a tongue depressor, modified by him from the Wolff pattern. Shekter [41] suggests the modification of the Beck snare by the addition of a Sluder or McKenzie handle, which is essentially the combination described some years ago by E. Lee Myers, and still earlier by Braun (sometimes known as the Sklar model). He employs the Sluder maneuver for engaging the tonsil. Walker [42] suggests the construction of the guillotine window in such a way that a finger cot may be attached to it for the purpose of catching the contents of the crypts extruded during the course of the operation.

Suction is employed in several new forms of enucleator. Bigelow's [43] modifications of various fenestrated instruments are well known. A complete description of these instruments appears in an article by their designer in the *Laryngoscope*.

Similar contrivances are described by Braunstein [44] and Hinojar.[45]

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40. Mulford, H. J.: Laryngoscope **34**:281 (April) 1924.
41. Shekter, A. J.: Laryngoscope **34**:277 (April) 1924.
42. Walker, T. E.: Laryngoscope **34**:231 (March) 1924.
43. Bigelow, N.: Laryngoscope **34**:223 (April) 1924.
44. Braunstein: Eye, Ear, Nose and Throat Monthly **3**:82 (March) 1924.
45. Hinojar: Rev. espan de laringol. **15**:305 (Sept.-Oct.) 1924.

Under the title: "What Constitutes an Ideal Tonsil Operation," Large [46] describes the procedures followed by him, after a survey of the most important clinics of Europe and America. This paper, read before the American Laryngological Association is subdivided as follows. 1. Preoperative care: this includes physical examination including urinalysis, blood coagulation determination and blood pressure reading. No cathartics are given but soda bicarbonate is administered in half-teaspoon doses three times a day for several days preceding operation. Subjects for local anesthesia receive their usual breakfast preceding operation. Those for general anesthesia get nothing by mouth. 2. All patients are hospitalized. 3. Anesthesia. For general anesthesia nitrous oxid induction and ether are used; for local anesthesia, 1 ounce (30 c.c.) of an 0.5 per cent. procain solution with 6 minims (0.36 c.c.) of a 1:1,000 epinephrin solution. The areas through which the needle is to pass are swabbed with cocain solution (20 per cent.) and painted with a 2 per cent. solution of iodin in alcohol. The patient is always in the recumbent position, and rubber gloves are always worn.

The guillotine operation is performed with a modification of the Walker instrument. No sponging of the fossae is done and suction has been given up as it is thought to favor hemorrhage. Large says:

> It is not so much the type of operation which is done, whether it be a form of dissection, or the Sluder Method, which counts, but the success of a tonsil operation depends on the ability of the operator, and not on the type of instrument which he uses.

No opiates are given, but bromids are administered if the patient is restless or in pain. In local anesthesia patients a similar dose is given one-half hour after operation. Fifty per cent. of silver nitrate, followed after the disappearance of the white membrane by a saturated solution of scarlet red in compound tincture of benzoin, is painted onto the wound. For pain, a powder of anesthesin and thymol iodid, one-half ounce (15 gm.) with 10 grains of menthol is insufflated into the tonsillar fossae every three hours. An ice collar is used.

Next to extirpation, radiation of the tonsils clamors for attention. There is hopeless division of opinions among the writers on the subject, but it may be of significance that when we divide the enthusiasts from the conservatives and the skeptics we have also neatly divided the roentgenologists from the laryngologists. In the works of those most zealously championing the cause of roentgen-ray and radium treatment, there is a persistent disregard for those insidious effects which we know small fibrous tonsils may exert on the system (compare Mygind,[33] referred to in the foregoing). Hypertrophies and recurrent acute con-

46. Large: Laryngoscope **34**:713 (Sept.) 1924.

ditions are undoubtedly improved, but what are we to judge of the effects on the smaller fibrosed tonsil already suffering from too great a proportion of confining fibrous bands?

Witherbee,[47] one of the strongest exponents of roentgen-ray therapy, states that two months after a series of treatments, the tonsils and adjacent lymph structures are reduced to a firm and fibrous mass, the size of which depends on the amount of fibrous tissue present before treatment began, itself the result of recurrent infections.

He contends:

> Those who claim that roentgen-ray treatment increases fibrous tissue are not aware that the only successful procedure in the prevention of the excessive formation of fibrous tissue (Keloid) up to the present time, is radiation.

He maintains also that roentgenotherapy given previous to operation, materially lessens the amount of dissection necessary. It is not easy to reconcile this statement with the common experience of operators that the difficulties of operation increase with fibrosis.

To him Lewis [48] replies:

> Another fallacy which it seems to me requires no elaborate argument to point out refers to the beneficent effect of converting to a mass of fibrous tissue incapable of cellular functional activities this highly specialized cellular structure, whose sole function depends on the possession of a full complement of special lymphatic cells, without which it could not functionate as a lymphatic organ. The same kind of reasoning would argue the advantage of converting normal liver and kidneys into fibrotic organs by some such agency as alcohol or lead. Let me adduce a quotation from Witherbee's article of April, 1922, in this connection: "The fibrotic tissue remaining after X-ray treatment and encapsulation of this abscess (of the tonsil) points out the fact that we leave only that type of tissue which nature utilizes in her defense against infection." Witherbee does not seem to realize the fact that these fibrous cells which are left are inert and that the only tonsil cells "which nature ultilizes in her defense against infection" are the lymphoid cells which disappeared, not because nature required connective tissues for defense against infection, but because the actual infection fighting cells fought a losing fight and suffered destruction. . . . In the writer's opinion, some of these arguments are specious, misleading and dangerous, for the reason that they make a compelling appeal not only to the patient but to the general practitioner, whose knowledge of the physiology of the important structures involved is not sufficiently intimate to protect him against misconception.

Detail men from some of the electrical manufacturers are now talking profoundly about tonsil reduction and "resolution," whatever that may be.

Shurly [49] has this to say:

> After twenty-five years' experience with this work, I believe that the Sluder method for children and the tonsil knife or scissors in adults, offer the best

47. Witherbee: J. Ophthal., Otol. & Laryngol. **28**:393 (Nov.) 1924.
48. Lewis, E. R.: Ann. Otol., Rhinol. & Laryngol. **33**:198 (March) 1924.
49. Shurly, B. R.: The Removal of Tonsils, J. A. M. A. **81**:800 (Sept. 8) 1923.

methods of enucleation. . . . We have no quarrel with the roentgen-ray expert if he can prove a better result than ours. On this scientific study alone we must stand. It is unfair to take advantage of the fear of the laity of anaesthesia, operative procedure and the hospital to draw cases to the roentgen-ray men unless a scientific statistical demonstration beyond experiment can justify the method.

Smith [25] outlines his treatment of epithelioma of the tonsil as follows: The most favorable results followed the combined use of radium and roentgen rays. Radium emanations were implanted in the mass and left to slough out or become encysted. Special attention was paid to the base of the tongue and its relation to the anterior pillar, as subsequent activity is prone to recur at this point.

Deep roentgen-ray therapy or the radium pack was used to prevent migration. Prognosis is good in cases under three months' duration, and bad in those over six.

COAGULATION

A word about coagulation. The consensus of opinion among thoughtful and conservative writers is well expressed by Carlton,[50] who says that while there may be some salient advantages to the method in certain cases, experience has taught him that it is by no means a procedure to be employed in all, nor by anyone not thoroughly conversant with it. While the operation itself is simple and requires but a few minutes, after effects are of consequence. Postoperative reaction is practically the same as that following enucleation, and requires the same careful treatment. The method is painless under local anesthesia and may be used for timid patients or for those in whom general anesthesia, loss of blood or mental tension is especially to be avoided.

The outstanding drawback of the method is the difficulty of determining the exact degree of penetration which occurs. The current passing out from all sides of the needle and from its tip, precedes it in its course, so that it is uncertain just when all the lymphoid tissue is reached and when the current, passing beyond, involves extratonsillar tissues, causing them to slough.

THE CONTROL OF BLEEDING

Lastly, three articles deserve especial comment on the control of bleeding. The first is by Love,[51] who made a study of the actual conditions present which cause and control bleeding. He found that immediate bleeding from tonsils and adenoids when uncontrolled ranged from 2 to 7 ounces (from 59 to 207 c.c.) and averaged from 4 to 4½ ounces (from 120 to 135 c.c.). In a previous article the author states that

50. Carlton: California & West. Med. **22**:554 (Nov.) 1924.
51. Love, J. K.: J. Laryngol. & Otol. **39**:493 (Sept.) 1924.

he performs enucleation with the O'Malley guillotine, and adenoidectomy with a curet, and it is presumed that those instruments were used in the present series.

In order to avoid this loss of blood during operation, especially in the large school clinics where time is an element, an assistant inserts a finger into the tonsil fossa immediately after the tonsil is removed, and holds it there for three minutes. A gauze pad, wrung from hydrogen peroxid is inserted into the nasopharynx after adenoidectomy. Bleeding by this method is said to total less than 1 ounce (30 c.c.).

The second is by Greene [52] and is a further contribution to the subject of the use of tissue juices to stop hemorrhage in tonsillectomy first presented by him in 1916. He finds that:

> 1. The application of the tonsil itself to the open vessels of the fossa controls bleeding more effectually than the usual method of sponging. 2. This technic conserves the patient's blood and at the same time lessens trauma. 3. In the reduction of hemorrhage and trauma, the danger of infection becomes less and convalescence is hastened.

The third is by Kelemen and von Gara [53] on the coagulation acceleration property of tonsil substance. Pig tonsils were employed in the form of a fine powder. This was used in preference to a fluid extract because it was found to be more stable. A 10 per cent. suspension of this powder was resorted to. Initial and complete coagulation in vitro were observed. Reduction of clotting time occurred in 70 per cent. of the tests, and it was determined that lesser suspensions produced lesser effects. So far, no experiments have been made in vivo for postoperative hemorrhage.

COMMENT

While this review of the tonsil situation makes no pretense at completeness of detail, which would drag it out interminably, still it is hoped that the bibliography offered will facilitate the work of the reader who may wish to search more deeply into its various phases.

University Club Building.

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52. Greene, J. B.: Ann. Otol., Rhinol. & Laryngol. **33**:193 (March) 1924.
53. Kelemen and von Gara: Ztschr. f. Hals, Nasen-u. Ohrenh. **7**:390 (April 10) 1924.

News and Comment

COMING MEETINGS

National Society Meetings

The American Otological Society will hold its annual meeting at Hotel Raleigh, Washington, D. C., Monday and Tuesday, May 4 and 5, 1925. Dr. Eugene A. Crockett, Boston, President; Dr. T. J. Harris, 104 East 40th St., New York, Secretary.

The American Laryngological, Rhinological and Otological Society will hold its annual meeting at Atlantic City, N. J., on May 22 to 25, 1925, inclusive. Dr. W. H. Haskin, New York, President; Dr. R. L. Loughran, 145 West 58th St., New York, Secretary.

Local Society Meetings

PHILADELPHIA: Section on Otology and Laryngology of the College of Physicians of Philadelphia meets on the third Wednesday of the mouth from October to June, at 8:30 p. m., at the College of Physicians. Chairman, Dr. Fielding O. Lewis; Secretary, Dr. James A. Babbitt, 2117 Chestnut Street.

CLEVELAND: Ophthalmological and Otolaryngological Section of Cleveland Academy of Medicine meets on the fourth Friday of each month at the Winton Hotel. Chairman, Dr. E. W. Garrett; Secretary, Dr. M. Paul Motto, Rose Building.

CHICAGO: Chicago Laryngological and Otological Society meets on the first Monday of the month from October to May at the Crystal Room, Great Northern Hotel. Chairman, Dr. E. H. Norcross; Secretary, Dr. A. A. Hayden, 25 East Washington Street.

MILWAUKEE: Milwaukee Oto-Ophthalmic Society meets on the third Tuesday of the month, at the University Club, at 6:30 p. m. President, Dr. John E. Guy; Sec.-Treas., Dr. John J. Brook, Majestic Building.

Abstracts from Current Literature

Ear

Some Neglected Corners of the Otological Field. J. Kerr Love, J. Laryngol. & Otol. **40**:110 (Feb.) 1925.

There are three corners of the otological field to be attended to. They are: (1) The staffing of infectious disease hospitals, poor law hospitals and institutions for the deaf with otologists; (2) to supply the public with information as to the use of aids to hearing; (3) the prevention of hereditary and congenital deafness.

From the hospitals with no otologist on the staff, infectious disease patients are often sent home with discharge from the ears and nose, thereby being a source of danger to others. This condition is often the start of chronic ear disease.

In institutions for the deaf, the author found, in some of the congenitally deaf, a family history of syphilis. In another group, which he calls sporadic congenital deafness, there was no family history of deafness or syphilis. By using the Wassermann test in 150 cases of sporadic congenital deafness and congenital deafness, syphilis was found in 5 per cent. or at most 10 per cent. Dr. de Parrel, of the Paris institution, using the Desmouliere test found syphilis in 50 per cent. of the cases of congenital deafness. Prof. Carl Browning regards the Desmouliere test as unreliable. For the subjects requiring an aid to hearing, it might be possible to give the indications of the type of cases suitable for electrical apparatus.

Browning says that the results of the Wassermann reaction in sporadic congenital deafness are compatible with Kerr Love's opinion that this condition is due to an expiring syphilitic lesion. The question is raised about the life period of an individual syphilitic infection in a family, apart from treatment. The author quotes Sir Jonathan Hutchinson as not believing that syphilis lasts into the third generation. This brings out two points which the author wishes to emphasize. (1) That hereditary deafness is not, and never has been, syphilitic, and (2) that de Parrel's view must be accepted with great caution.

Results of Zinc Ionization in Chronic Otorrhea in Over Six Hundred Cases. A. R. Friel, J. Laryngol. & Otol. **40**:125 (Feb.) 1925.

The author uses the method of zinc ionization outlined by Professor Leduc of Nantes in 1900. The patients are schoolchildren suffering from chronic otorrhea. In some cases the ionization is supplanted by the insufflation of boracic powder. No other local treatment is carried out.

He gives a table of the causes of chronicity with the number of cures from ionization. Tympanic sepsis yields most readily. The cause of the chronicity was found in the nose and throat in only seventeen out of 616 cases.

A second table gives the number of cases ionized with the number of treatments, and the number of visits to the clinic before the discharge ceased. In 234 patients the average number of ionization treatments necessary for cure was two.

The object of the ionization is to remove the sepsis, so for this reason the ionization must reach the seat of the disease. With this in view, aural polypi are first removed, disease in the nose and throat is treated; in inaccessible attic disease, an ossiculectomy is done, or where indicated a partial or complete mastoid operation is performed before ionization is carried out.

A third table summarizes and groups the causes of chronicity and outlines the treatment of each group.

The author's conclusion is that ionization is a cure for sepsis, and as chronic otorrhea is frequently maintained, owing to sepsis, zinc ionization is often a remedy for chronic otorrhea.

McNALLY, Montreal.

AFTER-TREATMENT OF OPENED OTOGENOUS ABSCESSES OF BRAIN. O. KÖRNER, Deutsch. med. Wchnschr. **51**:95 (Jan. 16) 1925.

Körner saw and treated four cerebral and two cerebellar otogenous abscesses in the last three and one-half years. One of the patients with a brain abscess had extensive encephalitis and meningitis at the time of the operation and died three hours later. All the others recovered. The author publishes the method to which he attributes his success: He follows the way which the pus took from the temporal bone, thus reaching a temporal lobe abscess from below and a cerebellar abscess from the front. He agrees with Macewen in doing as little as possible with the abscess cavity. As soon as it is opened, an artery forceps is introduced to keep the opening in the meninges and in the cortex free. The pus flows spontaneously if the head is held in a suitable position. A Killian speculum for the middle nasal meatus is introduced and the cavity inspected. Necrotic brain particles are removed with a forceps. Introduction of a finger or curet or the removal of the abscess membrane is contraindicated. The pus is sometimes very viscous. Therefore, lavage with a diluted solution of hydrogen peroxid should follow. The pressure of the water must be as low as possible and the abscess must be kept sufficiently open to allow it to leave the cavity freely. A powdering with boric acid or iodoform concludes the operation. Gauze must not be used even if there are pockets. The only rational drainage is obtained by stiff tubes, never by rubber drains. They should not touch the wall of the cavity. Roser's tracheotomy cannulas are quite suitable. They may be exchanged daily if necessary and a careful lavage with diluted hydrogen peroxid may be done. They are "shortened" by adding a pad of cotton outside between the skin and the external dressing to which they are fixed. Complications in one of the cerebellar abscesses (injury of the longitudinal sinus and of emissary veins) made drainage impossible, yet the patient recovered.

SCHULHOF, Chicago.

BRAIN ABSCESS WITHOUT CHANGES IN THE VISUAL FIELDS. V. E. URBANTSCHITSCH, Monatschr. f. Ohrenh. **58**:866 (Sept.) 1924.

A case of triple temporal abscess with vertical nystagmus but with no limitation of the visual fields, has been reported by the author. The patient was a married woman, aged 23, who had had suppuration of the left ear for six years. The discharge was always fetid. For years she had headaches in the occipital region which increased in frequency and severity. Dizziness was absent. The left drum membrane was almost completely destroyed. The tympanum contained granulations. The mastoid showed nothing in particular. There was no spontaneous nystagmus or fistula symptom. Response to caloric testing was lively.

A radical operation was done on the left mastoid, with exposure of the dura of the middle fossa which appeared normal. The postoperative course was normal except for headache on the fifth to the eighth day, forgetfulness on the thirteenth day and severe headache on the fourteenth day, with amnesic aphasia and irregular pulse varying from 60 to 90. The eyegrounds were

normal. Babinski, Kernig and abdominal reflexes were absent. There was some dermography. Spontaneous nystagmus, somewhat more marked to the left than to the right, occurred at this time. At times, vertical nystagmus occurred. On the fifteenth day the dura was widely exposed and the brain incised to the depth of 1 cm. and an abscess containing three tablespoonfuls of thick stinking pus was found. Cultures from the pus gave *Staphylococcus aureus*. The patient's course was somewhat irregular for the next fifteen days when she became very restless, vomited and became very much confused. The next day the dura was exposed higher up and another abscess opened, a rubber drainage tube being passed through both abscesses. Eleven days after opening the second abscess, a third abscess was found posterior to the first one and a coffeespoonful of pus evacuated. That evening the patient died.

The interesting points were: the visual fields were not contracted, there was no choked disk, the blood picture was atypical, vertical nystagmus was found at the start, three abscesses were opened, staphylococcus was found (which Urbantschitsch fears more than streptococcus) and clinically the mental symptoms changed very rapidly.

Boot, Chicago.

Partial Deafness for Spoken and Whispering Voice. F. Bruck, München. med. Wchnschr. **72**:186 (Jan. 30) 1925.

The current opinion that the partially deaf perceive the spoken voice better — that is, at a greater distance — than the whispering, is illfounded. The inverse may often be observed. In affections of the apparatus for transmission of sounds, the high pitched tones of the whispering voice are decidedly better heard than the deep tones of the spoken voice. This should be borne in mind in examination for partial deafness, and in the subsequent treatment. Insufflation of the eustachian tube may improve the hearing for spoken sounds, but not for the whispering ones.

Lapidus, Chicago.

Stages and Phenomena of Sexual Development in Their Influence on Otosclerosis. C. Stein, Wien. klin. Wchnschr. **38**:111 (Jan. 22) 1925.

Stein investigated the sex life in 125 otosclerosis patients, 68 per cent. of whom were women. The disease began at puberty in 27.1 per cent. of the patients. Abnormal menstruation was noted in 36.5 per cent. of the women. The progress was more rapid than in the patients with normal menstruation. The prognosis is especially bad in patients with dysgenital constitution, combined with anomalies of the nervous system and of the circulatory apparatus. The unfavorable influence of pregnancy is extremely frequent, although not constant. Sexual hypofunction and hyperfunction were common. Unsatisfactory sex life, especially coitus interruptus, were given by the patients as causes of impaired hearing and especially of subjective troubles. One man with psychic impotence was successfully treated by psychanalysis. At the same time the subjective acoustic disturbances improved. He found with Bauer many other abnormalities in his otosclerosis patients. This "status degenerativus" occurs in various combinations, including osteopsathyrosis and blue scleras, none of which is characteristic for otosclerosis. The sex life of otosclerosis patients and their descendants should be studied and directed carefully. The only therapy which has been done so far in this line was prohibition of pregnancy. Frey found that psychic injuries are also important. Roentgen treatment, calcium and even psychanalysis may be of value.

Schulhof, Chicago.

THE IMPORTANCE OF THE CONSTITUTIONAL FACTOR IN THE PATHOGENESIS OF EAR DISEASES. I. P. KUTEPOW, Ztschr. f. Hals-, Nasen-u. Ohrenh. **9**:497 (Jan. 20) 1925.

The parallelism between the character of the course of disease and the type of the leukocytic formula in forty-two cases was reported by Kutepow in the first communication, concerning chronic suppurative inflammation of the middle ear, at a meeting of the Throat, Nose and Ear Surgeons, at Leningrad, Dec. 9, 1924. Ninety-five patients are now at the author's disposal. Without going into hematologic details, he gives the general impression gained by analysis of 1,500 smears. Because of only theoretic interest, the author will not mention the interesting questions of the Arneth-Schillings formula, the grouping of the various kinds of leukocytes, the variations of the quality of the form elements of the blood during the first days after the operation, and other questions. Among all patients observed, about one-third were treated conservatively. The percentage of the neutrophils and lymphocytes, compared with the generally accepted normal number, is taken into consideration. Five tables accompany the discourse. Of twelve cases (Table 2) of neutrophilia, a favorable outcome was observed in only four. These cases comprise cases of radical operation, antrotomy, conservative treatment and patients previously operated on. Three patients were cured, three died, in one the result was favorable, and in five unfavorable. Unfavorable patients are those which cannot be termed "not cured," but which are almost hopeless in this respect.

Observations concerning monocytosis (Table 3): Of thirteen cases, eleven ran a normal, and two an unfavorable course.

Cases in which lymphocytosis was observed (Table 4): Forty-four of ninety-five cases were accompanied by lymphocytosis. A favorable course prevails. Thirty-two were cured completely; two were incurable.

The cases belonging to neutropenia and lymphopenia group (Table 3) furnish a complete contrast to the group of those with neutrophilia. Lymphopenia and neutropenia mean a considerable decrease of a certain kind of leukocytes compared with the average. In the first as well as in the second group, an increase in monocytes is observed, and both groups can be combined in a monocytosis group. Only in two out of the thirteen patients a continuation of the discharge without hope of cessation was observed after radical operation. In the eleven other patients a complete cure or a successful course of the healing process was observed. In three, a cure was obtained by conservative treatment.

The largest group, comprising forty-four cases, is the lymphocytosis group (Table 4). Here a favorable outcome prevails in thirty-two cases (72 per cent.).

The last group (Table 5), refers to cases with a leukocytic formula approaching the norm. To this belong a larger number of cured patients or patients approaching a cure. A certain constant relationship is noticeable between the character of the leukocytic formula and the outcome of the disease. In almost all healed cases the percental relationships of lymphocytes to the norm do not exceed the norm, but they present, within these limits, the highest values and always surpass the number of neutrophils. The same is the case concerning the lymphocytes in patients taking a favorable course.

In patients difficult to cure, the values which express the percentage relationship to the normal lymphocyte contents of the blood differ little from the number of neutrophils, or, the latter exceed in numbers.

In the monocyte group (Table 3), both unfavorable cases show an equality of both values. Kutepow does not claim that the prognosis can be established

by virtue of the leukocytic formula alone, but he does not doubt that it is of great importance in connection with all other methods of examination. It is known that every healthy man has his own individual leukocytic formula. In examination, we observe the average numbers. When marked deviations from these numbers occur, we claim that the organism has lost its equilibrium. If a certain phase of ear disease corresponds with a certain picture of the leukocytic formula, concerning which etiology, character of the process and details of treatment are of no significance, then we must come to the conclusion that certain causes exist in the body itself which influence the morphologic quality of the blood indirectly, and which are of influence concerning the success of the fight against the disease on the part of the organism. The doctrine of the constitution of the organism is more and more recognized. The importance of the constitutional factor in the pathogenesis in some special fields is accentuated by a number of authors, like Masslow, Brocq, Bauer, Astwazaturow and Wojatschek. The fact that especially virulent ear diseases develop in scarlet fever can be looked on as an expression of the constitutional peculiarities of the organism which changes its quality under the influence of an acute infection and becomes less resistant. So far, a generally acceptable classification of the diatheses has not been established. In some cases in which the constitutional anomalies are evident, Kutepow studied them according to Morew (Table 6), considering the lymphatic, asthenic, hemophilic and neuropathic anomalies. In forty-seven of ninety-five cases, one or the other anomaly was observed. Of the greatest importance are the lymphatic and asthenic constitutions. The lymphatic anomalies of the constitution, according to Kutepow's observation, accompany in almost half of the number of cases, grave processes, unsuccessfully treated, whereas in an asthenic constitution 25 per cent. of such processes were seen. If one considers that only those cases were recorded in which the anomaly of constitution was sufficiently evident, it can be seen that the percentage of such ear patients is very high. An asthenic constitution masters an ear disease with greater effort than any other constitution, so far as the outcome of the disease is concerned. Professor Masslow looks on otitis media in a lymphatic hypoplastic diathesis as a secondary symptom of such a constitution. In Kutepow's material the large percentage of cases of dry rhinitis is remarkable. Thirty-two of his patients suffered from dry rhinitis, of which eighteen showed atrophy, very plain in ten of the cases, and in four there was ozena. In grave cases of atrophy the percentage of unfavorably progressing cases becomes larger, yet in two cases of ozena careful treatment of long duration resulted in cessation of suppuration. Ear diseases are frequently accompanied by dry rhinitis, which latter takes an unfavorable course. Dry rhinitis is idiopathically as well as paratypically so constant and peculiar, that it can characterize qualities producing a disease (as nosologic entity such as, for instance, hemophilia, progressive muscular atrophy, etc.). Dry rhinitis must be looked on as a separate group of partial anomaly of the constitution, just as Prof. W. J. Wojatschek always emphasizes in his lectures.

Conclusions.—1. The constitutional factor is one of the most determining factors in the pathogenesis of ear diseases.

2. The lymphatic and asthenic anomalies of the constitution furnish the soil on which chronic suppurative otitis develops more frequently and takes a more malignant course.

3. The indications for radical operations on the ear must be different for people with a normal constitution and for people with an abnormal constitution.

4. Dry atrophic rhinitis furnishes a special group of the so-called local partial anomalies of the constitution.

5. The leukocytic blood formula in patients with chronic otitis media plays a certain part in the prognosis of the disease.

CONCERNING TUMORS OF THE ACOUSTIC NERVE. HANS GUENTHER and PAUL MANASSE, Ztschr. f. Hals-, Nasen-u. Ohrenh. **9**:516 (Jan. 20) 1925.

Tumors of the acoustic nerve are more frequent than tumors of the other cerebral nerves. According to Henschen, the reason for this circumstance lies in the fact that, in the region of the inner meatus, connective tissue of embryonic nature is still found between the branches of the acoustic nerve. The acoustic nerve, in this respect is different from all other cerebral nerves. According to Sternberg, the tumors of the acoustic nerve are mixed tumors: gliofibromas, neurogliomas and fibrosarcomas. Sternberg also contends that the fewest tumors called tumors of the acoustic nerve are really not such, but that they are tumors of the neighborhood, which developed in the acoustic cerebral recess and which produce replacement symptoms. Sternberg, no doubt, goes too far with this assertion. Three cases are described:

CASE 1.—A peasant woman, aged 57, entered the university medical clinic in Wuerzburg, Oct. 31, 1921, with a history of headache for one and one-half years, which radiated from the eyes to the forehead and occiput. She also complained of pain in the mouth when she took either hot or cold food. At times she had earache. The patient was somewhat deaf, the gait was uncertain and she complained of dizziness while walking. For two months the patient had complained of stiffness of the muscles of mastication, which made it difficult for her to speak. Also words failed her at times. After speaking for a longer time, this trouble was aggravated.

Examination.—Haziness of cornea on both sides, probably on account of parenchymatous keratitis was noted. Both eyes were slightly arrested when looking to the right and to the left. Double vision existed in the sense of an abducens paralysis on both sides.

The fundus was normal, vision was reduced on both sides to 0.1 on account of the cloudiness of the corneas. The field of vision was normal. The pupils reacted to light and convergence. The cornea reflex was weak on the left side and could not be elicited on the right side.

Pharynx: The uvula and palate were not sensitive to touch. On the right side of the hard palate a movable swelling, the size of the nail of the little finger, was noticed.

Tongue: On pulling forward, the tongue deviated somewhat to the right, and showed a slight tremor. The sense of taste was entirely gone on the left side, but was normal on the right side.

The sense of smell was normal. The thorax, heart and abdomen were normal, except that some extrasystoles were noticed.

Extremities and Reflexes: The lower extremities showed apparently a slight spasm in both ankle joints. The patellar reflex and the Achilles reflex were pronounced, the sole reflexes were normal. The knee-ankle experiment was impossible. The gait was ataxic and uncertain. Romberg's sign was positive, sometimes only intimated. The patient's walk deviated to the right.

Upper Extremities: There were no signs of motor irritation; no diminution of the active and passive motility or of the motor power. Coordination was normal. The reflexes of the triceps, biceps and the periosteum were normal.

There were no disturbances of sensibility. Painful pressure points were missing. The abdominal skin reflexes were present and there were no disturbances of sensibility. The lumbar puncture revealed a pressure of 14 mm. of water. Boiling, the Nonné and Wassermann reactions were negative; the blood Wassermann test was also negative. The motility of the head was not impaired, sensitiveness on tapping was not pronounced except a little in the temporal region. The spots where the nerves emanate were somewhat sensitive to pressure on the right side. There was a slight hyperesthesia of the left cheek.

Examination of the Cerebral Nerves: The olfactory nerve showed decreased power of smell on the left side, and it was entirely gone on the right side. The turbinates were hypertrophic.

The Optic Nerve: The fundus of the eye was normal, vision was found diminished on account of haziness of the cornea. The field of vision was normal.

Examination of the oculomotor, trochlear and abducens showed the following: When looking to the right, slight tardiness of the eye was noticed. On both sides there was a horizontal rotary nystagmus; at times double vision existed. The pupils reacted slowly to light and convergence. Both pupils were equally wide and round.

The trigeminus nerve showed the following: Some pain on pressure was present at the supra-orbital nerve on both sides. The right side of the face was hypo-anesthetic. The cornea and conjunctiva were anesthetic, and the right nasal cavity was hypo-anesthetic.

The Facial Nerve: There was no difference in the action of the muscles on the right and left sides. There was an intimation of Chvostek on the right side.

Acoustic Nerve: Air conduction was diminished on the right side when compared with the left side. There was no bone conduction on the right side.

Glossopharyngeal, Vagus, Accessory Nerves: The sense of taste was found much diminished on the right side of the tongue. A slight paresis of the soft palate was present.

Hypoglossus: The tongue deviated slightly to the right. All motions were free.

September 17 the patient was transferred to the ear clinic. The examination of the ear revealed the following. Both drum membranes were slightly cloudy. The whispered voice was heard on the right side 1.5 m., on the left side in a normal distance. On the right side the tuning forks c^1, c^2, c^3, c^4, c^5 were heard, but not c^{16}, c^{32}, c^{64}. On the left side c^{16}, c^{32}, c^{64}, c^1, c^2, c^3, c^4 and c^5 were heard. Weber's test was lateralized to the right. Schwabach's test was on the right side (—15), on the left side normal. The Rinné could not be made on the right side. It was normal on the left side. The Galton whistle showed as upper tone limit (0.6) on the right side. It was normally heard on the left side. There was horizontal nystagmus when looking to the right and to the left. Spontaneous nystagmus was present when looking foward.

Turning: When turned to the left there was an after nystagmus to the right of twelve seconds' duration; when turned to the right there was an after nystagmus of fifteen seconds to the left side. Four days later there was, under the same conditions, an after nystagmus present, lasting twenty-three seconds to the right, fifteen seconds to the left.

Caloric nystagmus occurred on the right side after 225 c.c. of cold water had been used. Past pointing, according to Bárány's test, was normal on both sides.

In spite of the fact that no grave disturbances of hearing and no facial paralysis existed, the patient was operated on on September 23, by request of the medical clinic. Krause's method was used because the patient heard too well for the translabyrinthine method.

Operation: Under local anesthesia, a flap, 3 by 3 cm. was made, consisting of skin, periosteum and bone, with a parietal basis. The dura was not tense. The dura was separated, and the cerebellum was lifted by flat spatules. The porus acusticus internus was free. The findings were negative, and the wound was closed. The day after the operation the temperature rose above 104 F. The reflexes increased, and the patient died September 29.

Necropsy (in part) was performed by Professor Kirch. A cyst, 2 cm. long and 1 cm. wide, containing yellowish green clear fluid was found on the right side at the cerebellum toward the pons. At the back, firm tissue was found, apparently a tumor with partly fatty degeneration. This tumor, the size of a cherry, was not sharply defined and penetrated only a few millimeters into the substance of the cerebellum. The whole right hemisphere of the cerebellum showed lemon colored edema. The left cerebellar half was smaller than the right.

Microscopic Examination (in part): Besides the large cyst, a series of smaller cysts were found, all without epithelium, or endothelium, filled with fine grained light masses and, in some places, with threads of fibrin. The osseous labyrinthian capsule showed nothing abnormal.

Inner Ear: The windows were intact. The whole labyrinth, the perilymphatic as well as the endolymphatic spaces were filled with light homogeneous masses of transudate, which was well stained by hematoxylin and eosin. The shape of the membranous labyrinth was almost entirely normal, with exception of the utriculus which appeared somewhat collapsed.

Inner Meatus: A large tumor filled the entire porus acusticus. It consisted of numerous bundles of tense fibers which were interwoven and crossed one another, and which resembled those which were described in the firm portion of the cystic tumor. The comparatively few cell nuclei were spindle shaped. The walls of the inner meatus were not enlarged. The acoustic nerve was pressed against the wall by the tumor. The cochlear portion was scarcely changed, but the vestibularis was rather thinned. Both branches were poor in nerve fibers and contained much connective tissue. The facial nerve was entirely intact.

Summary.—The functional examination of the ear revealed little. Instead of the expected hardness of hearing characteristic of an inner ear disease, symptoms of hardness of hearing characteristic of middle ear disease were established. The lower tone limit was impaired, whereas the upper tone limit was normal. Weber's test was lateralized to the right. Schwabach's test was much shortened. Only this pointed to an inner ear disease. The turning test in connection with past-pointing also did not give any assistance, although some authors (Guettich) consider their pathologic default as almost sure evidence of retrolabyrinthian changes. This test not only gave different results when repeated under the same conditions but it did not reveal any anomaly in past-pointing. This is the more astonishing because the cerebellopontile angle tumor had made a moderate impression on the lower portion of the right cerebellar hemisphere. The authors agree with the views of Fischer concerning past-pointing, namely, that in tumors of the brain, past-pointing does not furnish reliable means for diagnosis. So far as the operation is concerned, it was almost impossible, according to the statement of the pathologists, to

detect the tumor, because it originated without any signs of demarcation from the cerebellum and was not differentiated from the same by shape or color. The tumor could, perhaps, have been considered a neurinoma.

CASE 2.—A woman, aged 51, who had developed deafness during the last six years, suffered frequently from attacks of fainting and had a facial paresis on the left side. Hearing tests showed total deafness in the left ear and complete lack of excitability of the left vestibulary apparatus. There was a complete facial paralysis of the three branches of the facial nerve and a choked disk of median degree. The other cerebral nerves furnished only few and uncertain symptoms. On the diseased side the reflexes were partly missing and partly diminished. There was an ataxic, uncertain pronounced gait to the right. There were ataxic motions in the knees, ankles and nose—forefinger tests, and a positive Romberg sign. These symptoms pointed to the presence of tumor of the acoustic nerve. The prodromal symptoms, slow decrease in acuteness of hearing without any visible ear disease, feeling of pressure in the head, dizziness, feeling of weakness in the extremities, choked disk and pain in the occipital region were present. The typical annoying vomiting was missing, but focal symptoms, lesion of the acoustic nerve, namely, dizziness, decrease of hearing up to complete nerve deafness and symptoms in the surroundings like disturbances of innervation of the extremities, motor and sensory, were present, whereas the disturbances of the cranial nerves, with exception of the facial nerve, were not pronounced and mostly not present. In this case the translabyrinthine route was chosen. The region of the porus acusticus internus and the posterior cranial fossa was filled with a yellowish tumor which apparently reached the cerebellum in the depth. As much as possible of the tumor was removed and Koerner's plastic operation was done. The after-treatment consisted of radium treatment, and, after this was not tolerated any longer, deep roentgenization. The result was good. The tumor not only did not grow but it receded. The flow of liquor soon stopped. A small radium necrosis remained. The patient improved and only the cerebral symptoms persisted. Thirteen months after the operation, the patient was still living and there was no recurrence. This tumor was a fibrosarcoma. The mortality in patients operated on, according to Krause, is 81 per cent. (Henschen) whereas it is far less by the translabyrinthine method. A series of successful operations, by the translabyrinthine method, has been published (Quix, Schmiegelow, Kuemmel, Heymen and Zange, and Vorselles).

CASE 3.—This was a case of bilateral tumor of the acoustic nerve, which had not been diagnosed.

B. K., aged 60, was admitted Oct. 28, 1920. Since October 19, there had been a discharge from the right ear with headache and dizziness. In the left ear the patient was very deaf for one and one-half years. There were albumin and much sugar in the urine. The examination of the ears showed that the drum membrane on the left side was slightly clouded and thickened. On the right side there was free discharge with blood. The upper wall of the meatus was sagging. The drum membrane, so far as it was visible, was infiltrated and reddened. The perforation was not plainly visible. The mastoid process was very tender on pressure. The right facial nerve showed a slight paresis of all three branches. The whispered voice was heard on the left side ad concham, on the right side not at all, but conversation voice was heard at a distance of 2 m. The lower tone limit on both sides was c^1, the upper (Galton whistle) on the right side was 3.5; on the left side 2.9. The Romberg test showed that the patient fell to the right. There was no fixation nystagmus.

November 7, there was again profuse discharge, without fever and headache; no dizziness was noticed.

November 13, the sagging of the posterior wall had increased, the suppuration was profuse, therefore Manasse performed an antrotomy under local anesthesia. Extensive suppuration was found in the antrum and in the tip, also in a large perisinous cavity. There were many granulations present. There was no fever after the operation.

Contracted kidneys and diabetes mellitus were found. Sugar was 3.35 per cent., albumin 0.05 per cent. The patient was discharged December 13, and readmitted on account of disturbance of the equilibrium Jan. 23, 1921. The patient could not walk straight or stand straight and showed violent swaying and falling motions. Both labyrinths did not react to turning nor to the caloric test. From a fistula behind the ear there was offensive discharge and small sequestrums appeared. The fundi of the eyes were normal; the amount of sugar was 2.4 per cent.; albumin, 0.01 per cent. On both sides only low shouting could be heard. Under conservative treatment the symptoms abated. The patient was discharged March 1, almost completely deaf. Dec. 28, 1922, the patient died from nephritis and diabetic coma. Necropsy revealed, besides other findings, tumors of the acoustic nerve on both sides which had not been diagnosed. In the clinical picture, a simultaneously existing otitis interna predominated which was accompanied by otitis media on the right side. All disturbances of the cochlear and vestibular nerve had been attributed to the acute labyrinthitis.

On the left side there was a hearing disturbance, almost a deafness of the type of an inner ear affection. A degenerative atrophy of the labyrinth was assumed and looked on as a consequence of the grave diabetes. This diagnostic error was possible on account of two simultaneously existing diseases on the right side which had nothing to do with each other: (1) the labyrinthitis, and (2) the tumor of the acoustic nerve. The tumor was a hard fibroma located in the acoustic nerve. There was a tumor on each side, of the same size and in the same location. This symmetrical condition of both acoustic nerves is a perculiarity which is found, in a similar manner, in the labyrinth and in the acoustic nerve in other diseases. It happens in otosclerosis, which is observed in the same spot and to the same extent in both labyrinthine capsules; furthermore, in the case of bilateral metastasis in the acoustic nerves in primary carcinoma of the stomach (Hellman). Secondary changes in this case could be observed only in the left labyrinth because the extensive suppuration in the right ear did not allow any analysis. The left labyrinth presented an extensive degenerative atrophy of the fine branches of the nerve and of the spiral ganglion. In the small nerve channels of the modiolus and the osseous spiral plate, the nerve fibers had mostly disappeared and were replaced by a firm hyaline connective tissue, almost without nuclei, which was adherent to the periosteum of these channels. Such a condition has formerly been described as perineuritis. A similar change was found in the spinal ganglion. The ganglion cells were diminished in the single turns and had partly disappeared. Instead, Rosenthal's canal was filled with firm hyaline connective tissue. Corti's organ was little changed, or showed only changes which are considered to be cadaverous or agonal. In the labyrinthine spaces, congealed masses were found which could be stained with eosin. Similar masses were also found in Case 1. The authors consider this a symptom of hydrops by stasis, created by the pressure of the tumor on the vessels. This hydrops of the inner ear is favorable to the investigator because the nervous end-organs (Corti's organ, etc.), become

excellently preserved. This observation can be made in all pathologic aggregation of fluid, namely, in otitis interna serosa. Even if a more exact examination had been made, a diagnostic error could scarcely have been avoided. On the right side, the detection of the purulent otitis interna sufficed to explain the symptoms, and on the left side, the great disturbance of hearing was considered to be a degenerative atrophy of the labyrinth, which is frequently observed in grave constitutional diseases like diabetes and nephritis. This degenerative atrophy was present but probably was a consequence of the tumor. It appears to be doubtful whether the difference of the symptoms of a labyrinthine and à retrolabyrinthine disease are so sure that an exact diagnosis can be made.

AMBERG, Detroit.

INVESTIGATION OF THE INFLUENCE OF LABYRINTH IRRITATION ON BLOOD PRESSURE. WOTZILKA, Ztschr. f. Hals-, Nasen-u. Ohrenh. **10**:127 (Nov. 8) 1924.

Previous experiments by others showed lowering of blood pressure after the usual ten turns or the caloric test. The author tested after minimum stimulation by using one turn, or 5 c.c. of water at 20 degrees. Blood pressure and pulse were taken at one minute intervals, and graphed. There were two principal types of reaction. Type 1, primary increase in pressure, followed by depression, which may be followed later by another increase. Type 2, primary increase minimal or absent, prolonged depression. The pulse changes showed no constant relationship to blood pressure changes. The phenomenon does not take place after previous injection of epinephrin. The effect of epinephrin may last for five days. The results represent the reactivity of the vegetative nerve system.

EXPERIMENTAL EXAMINATION OF THE VEGETATIVE LABYRINTH REFLEX AND ITS CENTRAL LOCATION. DEMETRIADES and SPIEGEL, Ztschr. f. Hals-, Nasen-u. Ohrenh. **10**:133 (Nov. 8) 1924.

The authors state that labyrinth irritation increases intestinal tone and peristalsis, as well as lowering blood pressure (illustrative tracings are shown). Animal experiments show that this phenomenon remains after high section of the cord and after section of the centrifugal fibers to the medullary splanchnic center, but disappears if the labyrinth is excluded. They concluded that it is carried by the vagus. Spiegel, with the electrocardiograph, showed that no pulse reaction took place if psychic influences were excluded by section of the midbrain; that the pupillary reflex by way of the oculomotor, homolaterally and crossed, remains in spite of section of the cervical sympathetic fibers. The authors showed also that after section of the midbrain excluding the cortex, thalamus and forebrain ganglions (only the caudal portion of the roof of the posterior corpora quadrigemina remained), and after removal of the cerebellum up to the flocculus of one side, the reaction remained. They then destroyed in turn Bechterew's, Deiter's and Roller's nuclei without loss of the reflex, but in animals in which the nucleus triangularis was destroyed by hemorrhage, the homolateral reflex could not be elicited. The authors conclude that this reflex is carried over by some cell group in the nucleus triangularis; that it is not caused by vertigo, but may have a causal relation thereto, perhaps by the induced cerebral anemia, and that the labyrinth may have a regulative influence over blood pressure similar to that of the vagus.

EDUCATION OF DEAF MUTES AND SIGN LANGUAGE. PASSOW, Ztschr. f. Hals-, Nasen-u. Ohrenh. **10**:194 (Nov. 8) 1924.

Passow believes that a certain amount of well selected sign language is an aid in lip reading, not a detriment to its development. There was practical agreement in the discussion by Stern, Flatau, Kuemmel, Goerke and Frey.

LEWY, Chicago.

Pharynx

RADIUM THERAPY IN CANCER OF THE ESOPHAGUS. THE RESULTS OF FIFTEEN YEARS' EXPERIENCE. WILLIAM HILL, J. Laryngol. & Otol. **40**:73 (Feb.) 1925.

Malignant strictures of the gullet may, for practical purposes be regarded as outside the limits of radical surgery. We are reduced to palliative measures. The local means at our disposal are, passage of bougies, intubation, endoscopic removal of portions of the growth, galvano-cautery, and endo-esophageal application of radium salts.

Sarcomas yield more readily to radiation than carcinoma, and the softer forms of carcinoma are more readily affected than the harder growths.

The cases must be very carefully selected for radium application. Patients must be robust to stand the long exposure necessary, also to withstand any liberation of toxins that may take place. The annular growth must not be more than 5 cm. long.

The cooperation of a skilled radiographer is of value, but the author advises a careful endoscopic examination of the growth under a general anesthetic. If necessary, the stricture may be dilated with bougies. The length of the stricture is measured. The location is noted. Growths behind the trachea or left bronchus are unsuitable for radiation, owing to the danger of a fistula resulting.

It is necessary to radiate the entire length of the growth. The position of the radium in the container must be known. The dosage will vary with the strength of the radio-active substance, the thickness and quality of the container and the time of each application. The number of applications will be determined by the result of the first treatment. There is usually an interval of six weeks between the treatments, and after the first thorough examination, local anesthesia may be used.

In seventy-seven patients treated by radium, one-third of the number showed remarkable improvement, in another third, there was moderate improvement, and in the remaining third there was very slight or no improvement. In three the procedure proved fatal within a few days.

The author concludes that radium therapy is of value in a proportion of carefully selected cases of malignant stricture of the gullet.

McNALLY, Montreal.

INDICATIONS FOR PARTIAL AND TOTAL TONSILLECTOMY. G. PORTMANN, Presse méd. **33**:49 (Jan. 14) 1925.

Portmann relates that he observed during his recent visit to America the different methods for tonsillectomy. He believes, contrary to the French opinion in vogue, that a total removal of the tonsils is in no way more dangerous than a partial resection. He disagrees with the American surgeons on the indications for intervention. After having analyzed different views on the rôle of

tonsils in the organism, as protection against bacterial invasion, internal secretion, hematopoiesis, elimination of bacteria, he concludes that the immunization theory is the most probable. The germs invading the crypts produce enough antibodies to induce autovaccination. This may explain the enlargement of the tonsils, and the excessive development of the pharyngeal lymphoid system in children. Consequently, the presence of tonsils is important in early life, and should be respected to the utmost. If disturbances from the enlarged tonsils prove the operative intervention to be inevitable, a partial removal of the tonsils is suggested. On the other hand the tonsils are easily infected, without being enlarged, and the purulent crypts are situated deeply. In this case tonsillectomy is unavoidable. But this occurs mostly in the adolescent and in the adult. Local anesthesia, and Sonnenschein's method are advised for the tonsillectomy.

LAPIDUS, Chicago.

SUDDEN DEATH FOLLOWING "GLOTTIS EDEMA." FISCHER, Ztschr. f. Hals-, Nasen-u. Ohrenh. **10**:260 (Nov. 8) 1924.

The author calls attention to its medicolegal significance on account of the suddenness of death, and possible accompaniment of wounds due to agonal struggles or fall. He also claims that it may occur postmortem in alcoholic subjects, as an early symptom of decomposition, as the result of the stomach contents entering the larynx or as the result of trauma of the throat. It may occur as a birth injury in prolonged labor, probably due to circulatory disturbances; in face presentations due to help by the mother or physician; and as a result of efforts at resuscitation by catheterization of the trachea. It may occur in adults as a result of trauma; as a symptom of a general dropsical condition (in this case it is a transudate); as a result of regional inflammatory reaction, in which even bacteriologic or microscopic tissue examination may be necessary to decide.

LEWY, Chicago.

Larynx

CARTILAGINOUS TUMORS OF THE LARYNX (A STUDY OF ALL RECORDED CASES). IRWIN MOORE, J. Laryngol. & Otol. **40**:84 (Feb.) 1925.

The author gives a detailed report of sixty-two cases of chondromas of the larynx, taken from the literature from 1816 to 1924. There are several illustrations of the pathologic lesions described. These cases are outlined in an article published in the January, 1925, issue of the *Journal of Laryngology and Otology,* and abstracted in the March, 1925, number of the ARCHIVES OF OTOLARYNGOLOGY.

MCNALLY, Montreal.

PRESENT STATE IN PATHOLOGY AND THERAPY OF LARYNGEAL TUBERCULOSIS. J. SAFRANEK, Med. Klin. **21**:157 (Feb. 1) 1925.

Primary tuberculosis of the larynx occurs rarely, notwithstanding the exposure of the organ to aerogenous infection. Only twenty-five cases have been recorded in the last forty years, all without any concomitant lesions in the corresponding lymphatic glands. The author believes that the glandular lesions are not a characteristic sign of the condition. Laryngeal tuberculosis is a complication in the tertiary stage of pulmonary tuberculosis. The posterior

walls as well as the vocal cords are the points of predilection, thus presenting an analogy with the predominant localization of tuberculous lesions in the apexes and in the paravertebral parts of the lungs in adults. Statistics on over 1,000 personal cases showed that 33 per cent. of patients with pulmonary tuberculosis had lesions in the larynx. The complication occurred in over 60 per cent. of the cases in the tertiary stage, in 30 per cent. in the secondary and only in 10 per cent. in the first stage. In 90 per cent. of them, the tubercle bacilli were present in the sputum. The so-called "laterale Korrespondenz," namely, the coexistence of pulmonary and laryngeal lesions on the same side, was noted in hardly 50 per cent. of the patients. Laryngeal tuberculosis appeared mostly between the ages of 30 and 40. It is exceptional in children. Men seemed more disposed to the disease than women, the proportion being about from 70 to 30. Familial disposition may also play a rôle. Certain occupations which cause lesions in the laryngeal mucosa, as, for instance, dealing with metal, present a special predisposition. Safranek recalls the seven clinical forms, described by Blumenfeld: tuberculous infiltration, proliferative form, ulcerative, tuberculous tumors (fibroma and papilloma), miliary tuberculosis, perichondritis and lupus of the mucous membrane. The last form presents a different clinical picture from the skin lupus, and this is ascribed to a different immunity reaction in the two conditions. Special attention is called to laryngeal stenosis from edema, and to the foudroyant cases with fatal issue. The author quotes Schröder, who found recently that an antisyphilitic treatment may be a prophylaxis against laryngeal tuberculosis, yet the treatment in cases with coinciding tuberculosis may induce a rapid aggravation of the laryngeal process. Patients with tuberculosis coexisting with carcinoma in the larynx have been observed. The laryngeal process tends to necrosis in patients with diabetes and does not benefit from any treatment. Pregnancy represents a grave complication and should be interrupted in the first five months. The induction of a premature delivery is not indicated, since it cannot prevent an acute development of the tuberculous process. Artificial pneumothorax is absolutely contraindicated in cases with an unfavorable prognosis. Tuberculin treatment is a helpful adjuvant, but an intense reaction should be avoided. Alcohol injections in the superior laryngeal nerve and also its resection are listed among valuable analgesic methods. Surgical intervention may succeed, if the laryngeal affection coincides with a fibrous process in the lungs, but not in cases with cheesy degeneration. Galvanocautery and diathermy may give good results. Removal of the epiglottis, in patients in which the infection was isolated, was followed by recovery which lasted over three years. Observations on fifty patients proved that tracheotomy is effective, and does not exert an unfavorable action on the lungs. Laryngotomy should be tried after tracheotomy fails, and if the general and lung conditions are satisfactory. LAPIDUS, Chicago.

FREEZING OF THE RECURRENT LARYNGEAL NERVE IN TUBERCULOSIS OF THE LARYNX. VON DER HUETTEN, Ztschr. f. Hals-, Nasen-u. Ohrenh. **10**:284 (Nov.) 1924.

The author recommends, in unilateral tuberculosis of the larynx, temporary paralysis of the recurrent laryngeal nerve, which, after careful exposure by dissection, is frozen by ethyl chlorid. The paralysis lasts from two to three months, according to the length of application, and the author claims excellent results from the enforced rest of the larynx.

FURTHER EXPERIENCE WITH THERAPEUTIC PARALYSIS OF THE RECURRENT LARYNGEAL NERVE. LEICHSENRING, Ztschr. f. Hals-, Nasen-u. Ohrenh. **10**:287 (Part 2) (Nov.) 1924.

The author discusses the difficulty of arriving at conclusions regarding any therapeutic measure; the beneficial influence of rest; methods of obtaining rest, namely, tracheotomy, silence and artificial paralysis. Under the last head he mentions crushing, freezing, and alcohol injection of the recurrent laryngeal nerve. Because of absence of strain on the patient and simplicity of the method, he prefers the latter, using 50 per cent. alcohol with procain. Numerous apparently favorable cases are reported.

Zange calls attention to an old and useful method of obtaining rest by gastrostomy, which also does away with the swallowing movement, not achieved by the local paralysis alone.

Bruggeman prefers the freezing as simpler, surer and safer than alcohol injection.

Wessely (page 278) prefers his special carbon lamp and apparatus for photo-therapy; decries all surgical measures not absolutely demanded, questioning whether they do not do more harm than good.

Cemach (page 270) uses the mercury vapor lamp.

SYPHILIS OF THE LARYNX, DIAGNOSIS BY ROENTGEN RAY. THOST, Ztschr. f. Hals-, Nasen-u. Ohrenh. **10**:302 (Part 2) (Nov.) 1924.

The characteristic picture shows sharply outlined deposits of bone which are usually round, but they may be angular. These may be in the epiglottis, which should be cartilaginous normally, or may intrude on the ventricle, which should show an air space. The picture is contrasted with that of tuberculosis, which shows a diffuse outline with lessened density of bony parts. The author claims by his method to have diagnosed syphilis as a complication of tuberculosis of the larynx.

THE TREATMENT OF CICATRICIAL STENOSIS OF THE LARYNX AND TRACHEA. KNICK, Ztschr. f. Hals-, Nasen-u. Ohrenh. **10**:307 (Part 2) (Nov.) 1924.

The author recommends a thick-walled, red rubber tube. After submucous excision of the obstructing tissues, under local anesthesia, the tube, which has been cut obliquely at the lower end to fit exactly over the convexity of a properly fitted Luer tracheal cannula at the upper aperture, is inserted. The tube must be measured to fit from the top of the tracheal cannula to beyond the obstruction, but in no case should the upper end project above the arytenoids, otherwise deglutition is interfered with. The upper end is rounded by burning. A silk ligature is tied securely about the lower part and the two ends tied around the tracheal cannula, preferably over an aluminum wire or other crosspiece to hold the thread away from the skin and to act as a fulcrum to pull the rubber tube forward and keep it from sliding back and down over the tracheal cannula. A pendant weight is then attached to keep this pull steady. The rubber tube is inserted by pushing the lower oblique end downward into the trachea until the upper end passes into the tracheostoma, when a little traction on the ligature pulls it up into its position; the Luer tracheal cannula is then inserted, the ligature passed with one thread on either side, tied as described in the foregoing and the weight attached.

Advantages: The tubing is cheap and available; it is adaptable both as to length and flexibility; the method in all of Knick's patients was successful.

Schmiegelow claims success in about thirty patients by his method: laryngofissure, placing of drain tube fastened by silver wire across the larynx. The patients may go home to return in from one to six months. Wiebe prefers hard dilators; he advocates his special metal cannulas which do not cause pressure against the anterior wall.

LEWY, Chicago.

Nose

A CASE OF IRIDOCYCLITIS AND NEURORETINITIS WITH ETHMOIDITIS. T. D. ALLEN, Illinois M. J. **46**:375-377 (Nov.) 1924.

At a meeting of the Chicago Ophthalmological Society, Nov. 19, 1923, Dr. Allen presented the case of a youth, aged 16, who became ill because of an intestinal condition in August, 1922. This condition was essentially an ulcerative colitis. The patient had had a nasal discharge for many years. Part of his treatment while in the hospital consisted in irrigation of the left antrum.

A year later he was again taken to the hospital because of a recurrence. After he had been there for several weeks, during which time the left antrum was again irrigated, he developed acute conjunctivitis and an eyewash was ordered. Three days later the tonsils were removed. Seven days later the eye became painful and photophobia developed. Ciliary injection was present and the left iris was slightly discolored. Hot applications, a sweat, atropin and an eye shade were ordered. Five days after the onset of the iritis, as the patient became steadily worse, posterior snyechiae and precipitates on the back of the cornea of the left eye having formed, and the condition beginning in the right eye, the diagnosis of iridocyclitis was confirmed and the treatment of 5 per cent. ethylmorphin, hydrochlorin and foreign protein was advised. The latter was not used until the ninth day after the onset of the iritis.

At that time the patient had a violent blepharospasm, so that the slightest light caused intense pain in the left eye which was nearly as severe in the right. Consequently no fundus examination could be made, but it was ascertained that the pupils were not satisfactorily dilated and that there was moderate conjunctival edema.

A small dose of killed typhoid bacilli was given intravenously, which was followed by a severe chill and a rise of temperature up to 102 F. The ocular reaction was gratifying and the bowel condition also improved in an unexpected manner.

Four days later a second dose (about double the first) was given. The condition of the eyes improved so that it now became possible to use the ophthalmoscope. The right pupil was fairly well dilated; there were deposits on the back of the cornea and on the capsule of the lens; the vitreous seemed clear and the fundus normal. The left pupil was irregularly dilated, several posterior synechia having formed; there were numerous deposits on the back of the cornea and front of the lens so that the details of the vitreous and fundus could not be obtained.

Two more doses of vaccine were given and the eyes gradually cleared. A month after the patient's discharge from the hospital his vision showed right 20/50, left 20/100. After homatropin instillation the right pupil dilated evenly and normally, but the left was irregular being bound by several posterior synechiae. The right media seemed clear and the fundus normal but in the left eye the optic disk was slightly swollen, the outlines blurred, and the vessels for some little distance from the disk were slightly tortuous and

swollen; there was no hemorrhage or gross exudate, though the retina seemed slightly swollen.

The patient was immediately referred to the nose and throat department, where again a shadow was found in the region of the left antrum; the antrum was treated in the routine way, mucopus being obtained on irrigation. This was continued for five days, when he was discharged from the nose and throat department; there was no change in the ocular condition unless, possibly the neuroretinitis had become worse. Dental examination showed no abscesses.

The patient was again referred to the hospital, and the routine treatment prescribed, bed, hot applications, atropin, dark glasses, salicylates. A more thorough search was made in the nose. Submucous resection of the septum was performed, and when this had been done mucus was found coming from the region of the left ethmoid cells. The turbinate was fractured and the left ethmoid cells opened up widely. For the following few days there was no change in the fundus, but the swelling began to subside shortly thereafter. His vision on discharge was right 20/50; left 20/70. The swelling of the retina was still discernible, but much reduced. The form field was practically normal. The blind spots were both enlarged. No other scotomas were found.

The author feels that this picture was a unity—a single problem—the solution of which would naturally lie in the discovery and removal of the primary focus. The antrum of Highmore often acted as a reservoir for the secretions or several nearby accessory sinuses. In this particular case, repeated drainage and treatment of the antrum failed to affect the colitis; and soon after such treatment, while still in the hospital, iridocyclitis developed. This led the author to believe that the condition of the antrum had slight, if any, direct causative influence, and that probably the ethmoiditis had existed for many months.

The author feels that if improvement was permanent, it might be assumed that the ethmoiditis was the cause, if not of the origin, at least of the continuance of the pathologic picture. As the foreign protein injection was followed immediately by a rather remarkable reduction in symptoms, both of the intestinal and ocular conditions, it might have led the author to abandon the hunt for the primary focus, had not the neuroretinitis been found. Whether the neuroretinitis existed at the time of the uveitis could not be stated definitely.

The author was inclined to think it did. The tonsillectomy was done a few days before the iridocyclitis developed. He had been told that cures following immediately after tonsillectomy were due to either removal of a focus, or to absorption of certain elements at the site of the wound, which acted as a foreign protein. In this instance neither was the removal followed by improvement of the colitis, nor was there a general reaction similar to that following the foreign protein given a few days later.

H. H. Vail, Cincinnati.

Clinical Diagnosis of Rhinoscleroma. E. Soukup, Cas. lék. cesk. **64**:121 (Jan. 21) 1925.

Soukup made cutaneous and intracutaneous tests with various antigens from the rhinoscleroma bacilli. The best results were obtained with intracutaneous injection of an extract of a four days' culture, made with physiologic sodium chlorid solution. The reaction was much stronger than with a similar extract from the Friedländer bacillus. Controls were negative.

Schulhof, Chicago.

Miscellaneous

THE RELATIONS BETWEEN EYE MOVEMENTS AND OTHER CRANIAL MUSCLES. E. ARNOLD CARMICHAEL and MACDONALD CRITCHLEY, Brit. J. Ophthal. 9:49 (Feb.) 1925.

Certain types of movements associated with contraction of the extrinsic eye or eyelid muscles have been known for some time, for instance, the jaw winking reflex. In a recent clinical investigation at the National Hospital, London, six types of associated movements were noted, which may occur singly or combined. 1. The oculo-aural movement. If the eyes are fully deviated laterally, the helix of each pinna is slowly and deliberately rotated back toward the mastoid, particularly on the contralateral side. 2. The oculo-frontal movement. If the eyes are deviated laterally, there is a depression of the contralateral and a raising of the homolateral eyebrow. 3. The oculo-lingual movement. If the eyes are deviated laterally, the tongue may turn to the homolateral side. 4. The oculo-mandibular movement. If the eyes are rapidly deviated to one and then to the other side, a protrusion and deviation of the mandible to the contralateral side occurs. 5. The orbiculo-stapedial movement. In two cases with blepharospasm, the patients complained of a buzzing noise in the homolateral ear. 6. The oculo-nasal movement. In one case with extreme deviation of the eyes, there was dilatation of the nostrils. In ocular palsy these movements are not present, but the movement of the pinna can be seen, when a complete facial paralysis is present. This would seem to throw doubt on the innervation of the intrinsic muscles of the ear by the seventh nerve. The innervation may be from the fifth, for embryologically the third, fourth, fifth and sixth nerves have a common mesoblastic origin in the premandibular portion of the fetal embryo.

With regard to the nature of these associated movements, are they pathologic, indicating an abnormal nerve supply to the cranial musculature? Are they reflex in character? If so, they resemble the tonic neck reflexes of Magnus and de Kleijn. The selective nature of the motor response, its slow rate of manifestation, and its ready fatigability are points against this view. They are not facial tics because the subject cannot voluntarily reproduce the retraction of the pinna. The remaining possibility is that they are associated movements vestigial in origin. Investigation of facial and ocular movements in animals supports the phylogenetic theory of origin. For the jaw winking reflex, it is found in fish that the pterygoid and the orbicularis are in close anatomic association. In the small carnivora the external appendages of the ears and nose are highly developed. The eye movements are limited. In primates the external appendages of the ears and nose are smaller, and the eyes become more under voluntary control and are capable of a wider range of movement. In man visual acuity is marked, and the associated movements are less pronounced.

The oculo-frontal movement is present in shaggy haired animals, to remove the hair from the field of vision. During a very loud sound the eyes are screwed up. This is probably associated with the tension of the stapedius muscle, to dampen the vibrations. Again, when we look in the direction of a low sound, this is probably associated with a tension of the stapedius muscle, and renders the subdued tones more intense. In the reptile chameleon, if a Galton whistle is sounded behind it, the eyes are immediately turned toward the sounding body, and later it slowly turns its head and neck, and advances

toward the whistle. In the investigation of the animals so far, they have not found an instance of the tongue or snout reflex.

It was further noted, in several cases of disseminated sclerosis, with ocular nystagmus, that on lateral deviation of the eyes, there was a synchronous retraction-relaxation of the pinna. In many cases of disseminated sclerosis, without ocular nystagmus, there was a vertical nystagmus of the homolateral eyebrow. In one case on lateral deviation of the eyes, there was a contraction-relaxation of the right levator anguli oris.

As the facial nystagmus was observed in pathologic cases, it is difficult to state its nature. It is probably bound up with the ocular nystagmus, and is an incoordinated facial associated movement.

McNALLY, Montreal.

HIGH FREQUENCY CURRENTS IN OTOLARYNGOLOGY. LEROUX-ROBERT, Bull. méd., Paris **39**:43 (Jan. 10) 1925.

Leroux-Robert enumerates the results from treatment with high frequency currents he administered during the last five years. While the larger, indifferent electrode had been applied to the back, an active, horseshoe shaped, electrode had been used for the ear, and a rectangular one for the laryngeal region. In surgical diathermy the active electrode, causing a slough, had been reduced to a minimal size. Thermopenetration proved to be of great value in chronic exudative conditions of the middle ear. After the exudate had been checked, the hearing was rapidly restored. The favorable effect may be ascribed to an active hyperemia, or to colloidal changes in the exudate. Good results were also obtained in congestive and hypertensive forms of chronic laryngitis. Surgical diathermy did not rival with other means in malignant tumors, but proved to be the treatment of choice in nonoperable bleeding tumors. Papilloma of the skin and mucosa, except the diffuse type in the larynx, responded perfectly to electrocoagulation. The treatment seemed to be useful in tuberculosis of the nose and tongue, but was inferior to galvanocautery in laryngeal tuberculosis, and of no use in tuberculosis of the pharynx. Electrocoagulation had been employed in tonsillectomy, when the surgical method was contraindicated. Effluve and fulguration showed also a definite field of usefulness. Different skin diseases of the nose, such as acne, lupus, eczema and fissures in the vestibule of the nose benefited from the procedure. Rhinorrhea ozena, congestive sinusitis, otosclerosis responded to electrotherapy. Heitz Boyer is cited for using fulguration in malignant tumors and in ulcerative tuberculous lesions. The hope is expressed that with more perfect apparatus the treatment will have surprising results in otolaryngology.

LAPIDUS, Chicago.

SYMPTOMATOLOGY AND TREATMENT OF ACUTE TRACHEOBRONCHIAL FOREIGN BODIES. B. WISKOVSKY, Cas. lék. Cesk. **64**:1 (Jan. 3) 1925.

The author analyzes his ten cases, most of them children. The "flopping" sound was the rule in bodies moving in the trachea. He observed a moderate emphysema of both lungs and many dry râles in two such patients. The temperature was normal and the auscultatory phenomena disappeared immediately after tracheoscopic removal of the foreign bodies. He concludes that the syndrome was not due to an inflammation; it was a reflectoric pseudobronchitis, most probably due to an irritation of the pneumogastric nerve in an analogous way as the "asthme ganglionaire" is produced by enlargement of

the tracheo-bronchial glands. Emphysema of the occluded lobe was observed in several of his cases. In most of them, Brüning's explanation of a valve action of the foreign body was probable. Yet in one of these patients the foreign body was a tube which allowed an almost free communication of the air. He discusses the possibility suggested by Hynek that an increased permeability of the lung for roentgen rays might be due also to a lowered blood content — not only to an emphysema. The popular therapeutic method of shaking the patient with lowered head may be successful in the first moments, before the foreign body has passed the glottis. It is contraindicated later. Only when everything is ready for a tracheotomy an application of a few drops of cocain-epinephrin solution on the subglottis region (injecting through the cricothyroid ligament) might be tried and an attempt to shake the foreign body out might follow. The anesthesia would prevent the reflex spasm of the glottis which would otherwise occur as soon as the subglottic space is touched by the foreign body. Direct tracheoscopy or bronchoscopy is the method of choice. General anesthesia was necessary only twice in older children. He used lower bronchoscopy only once, because the child had been already tracheotomized.

THE HEMOLYTIC CONSTITUTION. M. GÄNSSLEN, E. ZIPPERLEN and E. SCHÜZ, Deutsch. Arch. f. klin. Med. **146**:1 (Jan.) 1925.

The authors' research deals with 105 cases of familial hemolytic jaundice. Their attention was especially directed to the other concomitant anomalies of constitution. In about 60 per cent. of the patients a steeple skull with secondary retraction of the root of the nose was present. A broad and flat dorsum of the nose (negroid type) was next to it in frequency. Deformities of the external ear, otosclerosis and chronic otitis media were noted in a large number of the patients.

SCHULHOF, Chicago.

DURAL ENDOTHELIOMA IN THE TEMPORAL BONE. JOSEF FISCHER, Monatschr. f. Ohrenh. **58**:773 (Sept.) 1924.

There is hardly a tumor about the structure and histogenesis of which so many views prevail as about that of endothelioma. For instance, a few of the names applied to it are: endothelial sarcoma, plexiform sarcoma, angioma cavernosum sarcomatodes, adenosarcoma, carcinoma sarcomatosum, lymph vessel cancroid, alveolar sarcoma, connective tissue cancer, lymphangitis carcinomatosa, and so on. The cause lies in the great variability of form and structure. Endothelial tumors may be solid or cystic, firm or soft, rich or poor in blood supply, circumscribed or diffuse. According to Borst they may become metamorphosed to either epithelial or connective tissue type.

Their clinical course is also variable. They usually show an expansive growth, relatively benign, and without tendency to generalization or metastasis, yet some forms have a rapidly infiltrating growth with a rapidly malignant clinical course.

According to Borst their characteristic histologic peculiarity is the presence of cells in layers which, unlike carcinoma, produce no keratin; further, that the cells composing these layers possess no keratohyalin granules nor protoplasm fibers, nor the rippling and stippling of true squamous epithelium.

This growth originates from the endothelium of the lymph vessels, the serous membranes and the endothelium of the dura.

Dural endotheliomas form a sharply differentiated group from the other forms. They originate not from the endothelium of the lymph vessels but from the flat cells of the meninges which are not identical with the endothelium of lymph and blood vessels. According to Ribbert these tumors arise at times from the cells that go to form the pacchionian bodies, so that one finds in these tumors a network of connective tissue trabeculae containing vessels, between and around which grow the flat endothelial cells in concentric layers.

Fick considers that the endothelial cells of the meninges are "Epitheliomata of the group of undifferentiated carcinoma" (basal cell carcinoma, corium carcinoma).

Psammoma formation often occurs in dural endotheliomas. The course is either benign, the growth expansive with no tendency to metastasis, or in numerous cases infiltrating with destruction of soft parts and bone.

Most endotheliomas of the temporal bone belong to the group of lymphangio-endotheliomas. Only one case has been described as hemangioma. The author was not able to find a case of dural endothelioma of the organ of hearing in the literature. He reports the history and necropsy findings of a case from von Eiselberg's clinic. The patient was a girl, aged 5½ years, with marked exophthalmos of the right eye. A soft painless mass filled the right orbit and cheek. There was a bruit de pot fellé. The skull was asymmetrical. There was tremor of the left upper extremity. Babinski's sign was absent. Bilateral choked disk was present as was also bilateral tubal tympanic catarrh. The right drum membrane showed a striking red shimmer, particularly in the upper posterior quadrant. Hearing was lowered in the right ear. There was spontaneous rotary and horizontal nystagmus toward each side. The right ear did not react to the caloric test by Kobrak's method. After prolonged irrigation, nystagmus to the opposite side occurred.

Roentgen-ray examination showed a hydrocephalic skull. An attempt at pneumography failed. The next day after the examination, somnolence and an arrhythmic pulse occurred and on the third day the patient died.

On postmortem examination, a growth was found in the middle fossa of the base of the skull and of the right temporal lobe of the brain, extending into the orbit, the upper part of the pharynx and the musculature of the infra temporal fossa.

Histologically, the growth was an endothelioma of the meningeal type. It filled the middle ear and extended into the auricle. The capsule of the labyrinth was surrounded by the growth.

Boot, Chicago.

Death by Suffocation and Status Hypoplasticus (Status Thymolymphaticus). Meyer, Ztschr. f. Hals-, Nasen-u. Ohrenh. **10**:262 (Nov. 8) 1924.

The author admits the existence of status thymolymphaticus as a clinical entity, but claims that in many cases it is merely a part of what pathologic anatomists recognize as hypoplasia of the chromaffin system, principally indicated by very small suprarenals. He also mentions a congenital, isolated thymus hyperplasia, and a condition of status lymphaticus acquired through infection. He also distinguishes thymic asthma, thymic death and laryngismus stridulus.

In status hypoplasticus, sudden death may occur with or without suffocation symptoms, and the question is raised are these deaths due to mechanical or secretory causes. The author believes that most of them are due to constitutionally inferior internal secretory organs. He reports a necropsy on a

child, whose suffocative symptoms had been temporarily relieved by tracheotomy. Examination showed evidence of rickets, enlarged thymus, enlarged lymphatic glands throughout, including follicles at the base of tongue, Peyers patches, intestinal follicles, etc., both suprarenals exceedingly small; pharyngitis, bronchitis, tracheitis. There was no evidence whatever of compression of the trachea, bronchi, the large vessels or the vagi, and the author is certain that the position of the tracheal cannula during life was correct and that there was no obstruction from that source.

The author suggests the use of epinephrin to avert death in such cases. (Epinephrin is made from the cortex, while the medulla is essential to life. A. L.)

LEWY, Chicago.

Society Transactions

COLLEGE OF PHYSICIANS, PHILADELPHIA
SECTION ON OTOLOGY AND LARYNGOLOGY

Jan. 21, 1925

FIELDING O. LEWIS, M.D., *Chairman*

SOME OBSERVATIONS ON CERTAIN FORMS OF CHRONIC SINUSITIS. Presented by DR. ROSS H. SKILLERN.

Dr. Skillern made reference to chronic inflammatory conditions of the maxillary, frontal and sphenoid sinuses. A plea was made for the early correction of any intranasal abnormality which might serve to prevent subsidence of the pathologic process. The sinus question should be approached with the idea of providing adequate aeration and drainage, avoiding radical procedures as much as possible.

Needle puncture of the maxillary antrum is considered by Dr. Skillern to be an important diagnostic and therapeutic procedure. Much information relative to the condition of the sinus mucosa can be obtained in this manner. It is his practice to inject slowly a small amount of air after insertion of the needle. If obstruction is met, a stylet is inserted. No untoward results have been experienced.

DISCUSSION

DR. GEORGE B. WOOD, in referring to antrum puncture, said that he considered it safer to make the primary injection with fluid rather than with air. He cited the case of a patient who was unconscious for half an hour, following gradual air injection.

DR. W. A. HITSCHLER said that his practice was to test the patency of the needle before injection.

DR. GEORGE FETTEROLF said that his method coincided with that of Dr. HITSCHLER. A flexible bougie is used for testing the patency of the needle.

DR. FIELDING O. LEWIS referred to the publication of an article by an English writer, who reported fifteen deaths from antrum puncture. Conservative sinus surgery was endorsed.

OBSERVATION ON THE USE OF THE ARTIFICIAL DRUM MEMBRANE. Presented by DR. WILLIAM A. HITSCHLER.

The type of patient in whom Dr. Hitschler has used an artificial appliance to some advantage showed tympanic destruction, total or partial, with or without loss of the ossicles. In his hands the best results were realized by using a phenol (carbolic acid), 5 per cent., glycerin moistened disk, cut approximately to the size of the normal tympanum, having a thickness of about 1 mm. To facilitate removal, a piece of fine silk thread long enough to reach the concha is attached. The patient is taught to remove and to introduce the cotton disk, at which maneuver he soon becomes quite adept.

The degree of moisture of the disk is important. Many solutions have been employed by various aurists, among which are boric acid, physiologic sodium chlorid solution, various percentages of alcohol, liquid petrolatum, and glycerin with or without phenol. A condition somewhat less than saturation with one of the foregoing solutions seems to be the optimum.

Inflammation with discharge is the usual sequel to the initial introduction. When the inflammation once is established, the cotton is removed and reinserted only after subsidence of the reactionary phenomena. This process is repeated until tolerance to the foreign body is established.

Many patients so treated by Dr. Hitschler were quite disappointing. In only a few did marked improvement occur. In three patients the results were brilliant.

DISCUSSION

Dr. B. A. Randall said he had used to advantage, in conditions similar to those referred to in the foregoing, an astringent solution of 5 per cent. zinc sulphate on a cotton pellet. Restoration of the tension of the parts is the important factor in the efficacy of such treatment, and to substantiate this idea Dr. Randall referred to the paper method of Blake and the surprising results it sometimes gives. Often the reaction caused by such appliances is of such permanent and beneficial value that the applicance can be dispensed with, with no reduction of auditory acuity.

Dr. S. MacEwan Smith said that in selected patients procedures of this kind frequently gave very definite increase in sound perception. He has used cotton plugs saturated with petrolatum for many years. If the oral window is surrounded by adhesions, results are less likely to be satisfactory.

Dr. G. M. Marshall cited the case of one patient almost totally deaf, who was successfully treated by means of the application of a small piece of note-paper.

Dr. F. O. Lewis referred to a discussion on this subject previously heard in New York City. It was the consensus of opinion at that meeting that a cotton pledget in the form of a tack gave the best results. In his experience, aqueous solutions for moistening are superior to others.

Dr. Hitschler, in closing the discussion, demonstrated his method of making the cotton disks referred to in the foregoing.

Perforation of the Faucial Pillars, with Report of a Case. Presented by Dr. Edward H. Campbell (by invitation).

Dr. Campbell presented the case of a girl, aged 9 years, who showed a definite perforation of the right anterior faucial pillar. A thorough survey of the literature was given at the same time, which showed but thirty-three similar cases reported previous to that of Dr. Campbell. Various observers have speculated on the cause of this anomaly, some considering it to be a congenital fault, others feeling that inflammatory disease was the etiologic factor. It was the feeling of Dr. Campbell that the latter explanation applied to his case.

DISCUSSION

Dr. George Fetterolf referred to the embryonic origin of the faucial pillars from the pharyngeal membrane, and diagrammatically showed how such anomalous perforations could possibly be congenital faults. He asked the speaker if in his review of the literature he had found any reference to Vincent's angina as a possible cause.

Dr. Campbell said that he had found no reference that indicated Vincent's angina had produced such perforations.

Thymic Death in an Adult During Local Tonsillectomy. Presented by Dr. David N. Husick.

Dr. Husick reported the death of a woman, aged 20, during tonsillectomy under local anesthesia. Twenty-one days previously this patient had been admitted to the University Hospital, where she was treated in the medical ward for acute arthritis. On subsidence of this acute condition, it was considered proper to remove her tonsils which were obviously diseased. No definite physical abnormality having any bearing on the case was discovered previous to operation, except a moderate increase of supracardiac dulness.

When she was presented for operation, the anterior pillar on each side was touched with 10 per cent. cocain solution. Later, 8 c.c. of 0.5 per cent. procain solution, plus 2 drops of epinephrin, were injected into each tonsil. The left tonsil was rapidly removed. About one minute following the procain injection,

the patient showed excitement which was soon followed by loss of consciousness and clonic convulsions. Respiration became shallow, the pulse feeble, and, in spite of heroic stimulation, death occurred, respiration ceasing a few seconds before cardiac arrest.

A postmortem examination by Dr. Lucke showed no blood extravasation nor injury to the large vessels near the operative field. The thymus was found to be greatly enlarged and gave microscopic evidence of distinct hyperplasia. The spleen was normal and no general lymph adenopathy was present, the abdominal aortic nodes alone showing moderate enlargement. Although a complete necropsy was performed, no other findings bore any relation to the cause of death. A chemical examination, made by Dr. Richards, of the solution used, found it contained 0.63 per cent. procain. In view of the positive and negative postmortem findings, it was considered proper to place this case in that group where death occurs from slight cause in the presence of an existing status thymicus.

DISCUSSION

Dr. J. A. Babbitt spoke of that group of persons falling in the class termed "status lymphaticus" who are especially susceptible to sudden death. The actual cause of death in this group is not known, but it was the feeling of Dr. Babbitt that in this class a general moderate inflammation of all mucous membranes is present, which gives rise to products acting as inaugurators of anaphylactic phenomena.

Dr. Eves cited the case of a patient who, under similar conditions, showed symptoms quite like those mentioned by Dr. Husick and with the same termination. Slight thymic enlargement was discovered at necropsy. It was his feeling that individual susceptibility to the cocain series was probably the more likely explanation for this sort of death.

Dr. B. A. Randall referred to a patient who died twelve hours after tonsillectomy under ether anesthesia. Necropsy findings were negative with the exception of marked thymic enlargement.

Dr. Wilson said that preliminary hypodermic narcotic medication was efficacious in reducing nervousness, and in this manner making sudden death less likely.

Dr. G. M. Marshall spoke of the tonsil operation under ether anesthesia. It was his feeling that the margin of safety is greatly increased by the use of a general anesthetic.

Dr. George Fetterolf spoke of dissections performed by Dr. Giddings and himself on a series of fifty infants. These specimens were formalin prepared, and thorough study of the gland in situ showed that the trachea could not be compressed by the thymus.

Dr. S. MacEwan Smith felt that tonsillectomy under local anesthesia was attended with too much risk to warrant its use. He cited a case of sudden death under ether. It was his feeling that so little is known about death from the condition termed status lymphaticus, that we would do well to avoid using this term until we have more definite knowledge of the physiologic action of the thymus gland.

Dr. Husick referred to the routine roentgen-ray examination of all children, between 1 and 14 years of age, scheduled for tonsil operation. Such procedures are at present carried out by the Massachusetts General Hospital and the Massachusetts Eye and Ear Infirmary. It was his opinion that such precautions should be more generally used.

Feb. 18, 1925

The Lung of a Lamb as a Means of Perfecting Bronchoscopic Technic. Presented by Dr. M. J. Mandelbaum (by invitation).

It is admitted by all men doing bronchoscopic work that much time must be spent in painstaking practice on both the cadaver and living dog in order

to do such work properly on the human being. On account of the difficulties experienced in securing such material for practice work, it occurred to Dr. Mandelbaum that material from slaughter houses might advantageously be used. After experimenting with the lungs of pigs and sheep, it was finally decided that the lung of a lamb adapted itself best to this purpose, it most nearly approximating the human pulmonary apparatus in appearance and size. Either fresh or formalized specimens may be used.

The apparatus demonstrated consisted of the lung of a lamb, the trachea of which was sealed by a rubber diaphragm through which the endoscopic instrument was inserted. Inflation of the lung and simulation of the respiratory movements were made possible by a series of tubes connected with a foot bellows. All forms of endoscopic procedure can be practiced on such preparations.

DISCUSSION

Dr. Gabriel Tucker complimented Dr. Mandelbaum on his ingenious device, and said he felt that such preparations would be of great value in the teaching of bronchoscopic technic.

Dr. W. G. Moore felt that the pulmonary lobe relations could be demonstrated by using this sort of apparatus.

Dr. George M. Coates said that he considered the apparatus to be a decided advance in the facilities for teaching bronchoscopic technic. The using of fresh material and the simulation of respiratory movements are definite improvements on the old type of manikin.

Closure of Laryngostomic Fistulas. Presented by Dr. Charles F. Nassau (by invitation).

An operation for the closure of laryngostomic fistulas was presented by Dr. Nassau. Using field block anesthesia, an incision is made on three sides of the fistula, superiorly and laterally, far enough removed from the margin to be located in healthy tissue. At the inferior margin the incision is prolonged downward for a distance sufficient to give an adequate skin flap. This flap, along with the subcutaneous fat, is reflected upward and sutured to the incised margins of the fistula. It is important that fine silk be used in this procedure and that all knots are so tied that they lie inside the sutured surfaces. Following this, the skin is undermined and loosely sutured in the midline with silkworm gut.

In this operation the following points are of great importance in order to secure closure of the opening. 1. Postponement of the operation if the patient shows any signs of bronchitis or coryza. 2. Thorough disinfection of the skin. 3. A flap of sufficient size, so that absolutely no tension is made on it by the silk sutures. 4. Avoidance of the use of catgut in the flap sutures.

Following this technic Dr. Nassau has secured perfect closure in a series of seven patients referred to him with laryngeal fistulae following tracheotomy.

Dr. Louis Clerf supplemented the paper of Dr. Nassau with a series of slides showing the extensive scar tissue formation that sometimes follows the use of tracheotomy tubes. This cicatrization is especially troublesome and abundant when a high tracheotomy has been performed.

A Case of Rhinoscleroma in a Man. Presented by Dr. G. B. Wood.

The patient was an American, who had never lived outside of the United States. The diagnosis was made by Dr. Allen J. Smith after a microscopic study of biopsy material. Some improvement had been noted in the condition following a series of intravenous antimony injections.

DISCUSSION

Dr. Fielding O. Lewis requested information regarding the exact dosage of antimony used.

Dr. R. J. Hunter, who had treated the patient, stated that treatment was started using intravenously 1 c.c. of a 1.0 per cent. solution of tartar emetic, antimony potassium tartrate, and gradually increased until 10 c.c. was given. Dr. Small of the Philadelphia General Hospital has used this treatment to advantage in cases of granuloma inguinale. The organism present in this condition is a bacillus belonging to the same group as those bacteria found in the lesions of rhinoscleroma.

Dr. N. P. Stauffer referred to several cases of this disease seen by him in Vienna, which on account of extensive tracheal involvement had required tracheotomy.

Mediastinal Abscess Following Laryngectomy for Laryngeal Carcinoma. Presented by Dr. Fielding O. Lewis.

A month following operation, the patient began to show evidence of infection, pain in the chest and pus in the region of the trachea. A fistulous tract posterior to the trachea which led to a large abscess cavity was discovered, the presence of which was confirmed by roentgen ray. Repeated evacuations of the cavity by means of suction, feeding through a nasal tube and careful nursing were followed by complete recovery. Dr. Lewis stated that many such abscesses following this operation have been reported and that recovery occurs in about 40 per cent. of cases.

Dr. George Fetterolf presented two cases, illustrating the necessity of careful and thorough study of the patient before attributing the cause of the condition to be tonsillar infection. The first patient, a young man, was referred by an internist for tonsil removal on account of a condition which had been diagnosed sciatica. The tonsils were diseased and were removed. A few weeks later, a spontaneous fracture of the right femur occurred and a roentgen-ray examination showed the presence of a large bone sarcoma.

The second patient was a man, middle aged, who complained of neuritis of the right shoulder. Although a certain degree of tonsil infection was present, operation was deferred until an examination of the prostate gland was made. Definite infection was found in this gland and appropriate treatment carried out, after which the neuritis of the shoulder entirely subsided.

DISCUSSION

Dr. A. B. Randall spoke regarding the ease of prostatic examination and the definite information that can so be obtained. A positive venereal history is not essential for prostatic infection. Even in specific prostatitis after three years the gonococcus is rarely found, while secondary invading organisms may be present in abundance. Nonspecific infection of the gland may arise from: constipation, trauma, focal infection, sexual excesses. Frequently the infection is not found until the second examination.

Dr. G. Morley Marshall reported the case of a boy, aged 11 years, on whom he had performed a mastoid operation for acute mastoiditis. Following this operation a red, fungus-like growth appeared in the wound, the identity of which was not determined. Later the wound for several weeks discharged a clear serous fluid which eventually became dry following the use of aluminum acetate.

Book Reviews

OTO-RHINO-LARYNGOLOGIE. By G. DE PARREL. Paris, A. MALOINE et fils, 1925.

This little book is written especially for the general practitioner. It calls attention to certain practical points which are of value to the practitioner in his treatment of patients which are seen by him, first, enabling him to give them adequate treatment or allowing him to judge correctly of the severity of the condition and if he so desires to refer the case to the specialist.

The book is concise, as the author avoids all pretentious diadactic phrases and bibliography. He calls attention to certain syndromes which he describes as: cervicofacial, from hereditary syphilis; an otorespiratory syndrome, of neuro-arthritic origin; a syndrome of laryngeal obstruction and the adenoid syndrome. These are taken up separately and explained at length.

Prophylaxis of laryngeal conditions and troubles of the speaking and singing voice are considered both in the young and in the adult.

Treatment of cancer of the larynx, with the various operative procedures are described and illustrated, as well as the treatment by radiotherapy. A chapter is devoted to the etiology of chronic deafness, with the prophylaxis and treatment given.

He gives what he terms the "up-to-date" procedures in treatment of the laryngotracheal diseases which include: heliotherapy, stab tracheotomy, intratracheal auto injections and anesthesia of the superior laryngeal nerve.

In one chapter, heredity of deafness is considered, with the idea of preventing union between such afflicted persons. Reeducation of the deaf is considered.

In the last part of the work, certain diseased conditions termed "urgent" oto-rhino-laryngology are spoken of. These include such conditions such as: Foreign bodies in the ear, furunculosis, acute otitis media, acute and latent mastoiditis, nose bleed and peritonsillar abscess. A list of prescriptions for the various ailments which general practitioners are liable to encounter are given.

The book is entirely practical and should have a place in the library of every busy doctor.

CAVITY SUTURING IN OTOLARYNGOLOGY. By LOUIS SAMENGO. Buenos Aires, Imprenta de obras de E. Spinelli, 1924.

This is a monograph on the method and technic of applying sutures in the nose and throat, illustrating the instruments and technic in the several procedures. Some of the instruments are new and the technic modified to suit the particular instrument employed. The method and instruments for suturing the nasal septum are practically the same as have been used for some years.

Tonsil pillar sutures are placed by a self-threading needle, introduced either from before backward or from behind forward by instruments designed for each procedure.

Staphylorrhaphy suturing is shown in the use of a staff needle and a thread carrier to place the suture in the eye of the needle staff. The illustrations are clear and the explanatory text is short and to the point.